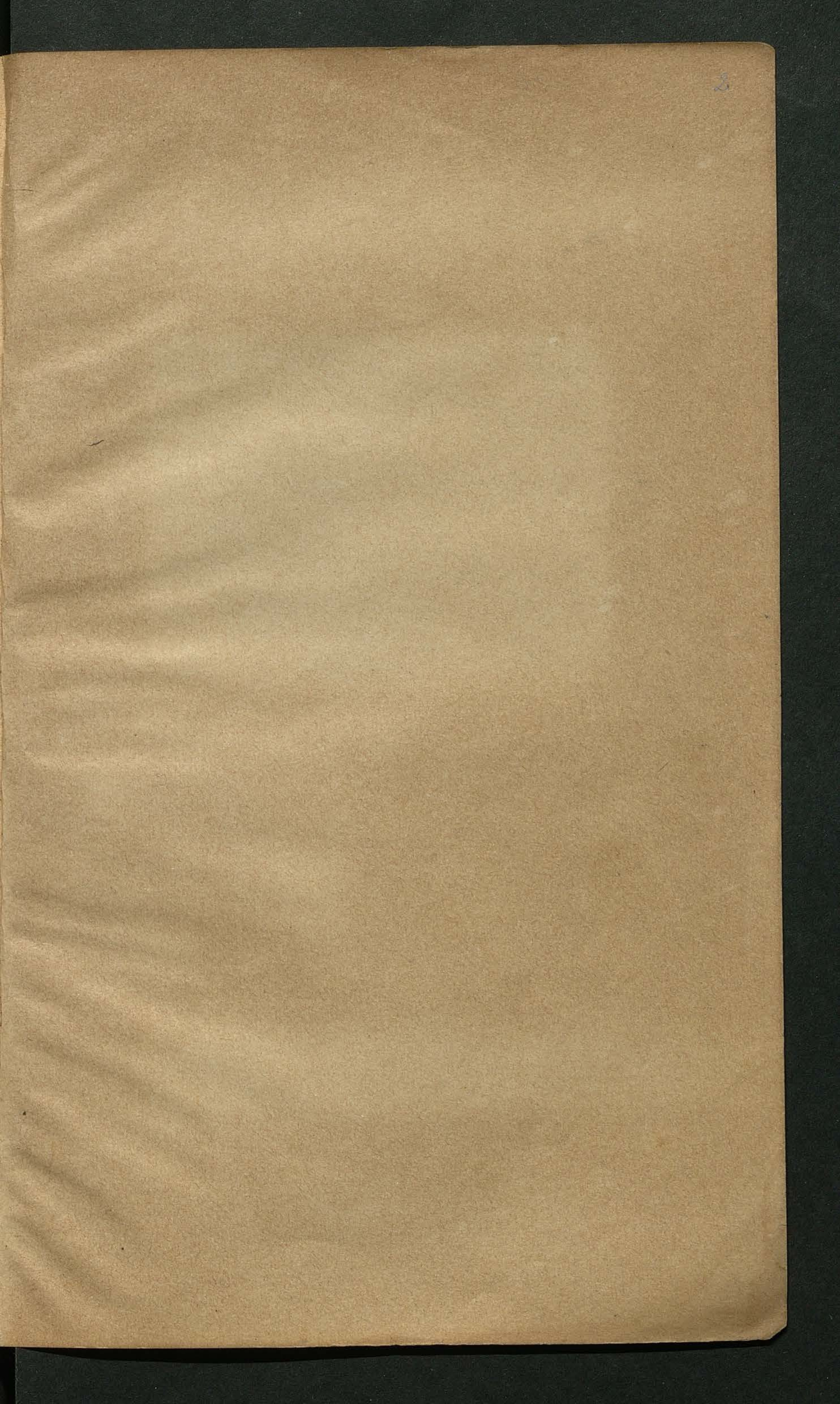
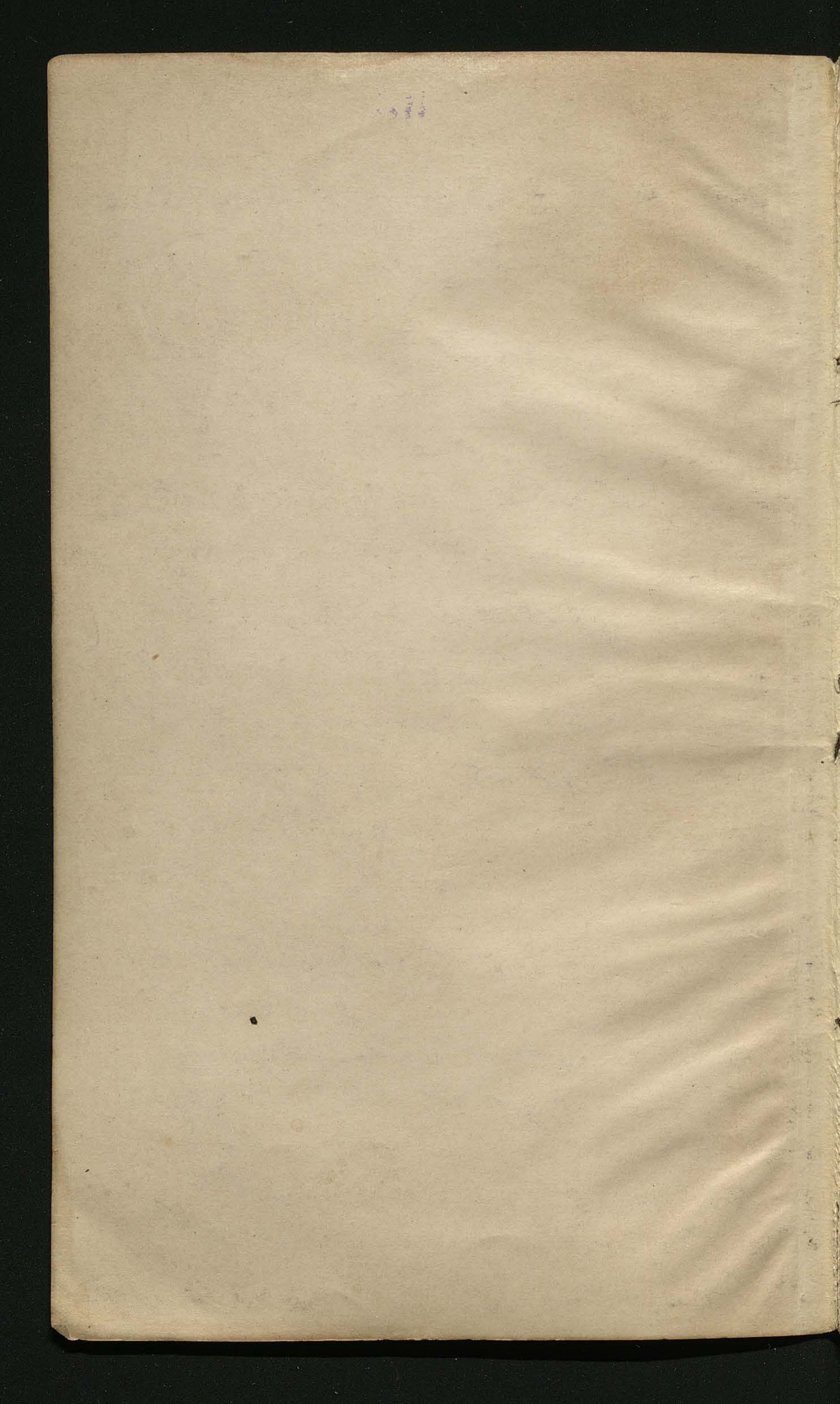

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I.
III. S. 91/92
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Theorie d. El. [illegible]

Elektrostatik — El. Strom [illegible] El. — ~~Elektrodyn. Induction~~

Magnetismus [illegible]

Elektrodynamik

[illegible] El. magn. [illegible] — El. dyn. Induction

[illegible] el. [illegible]

Elektrische [illegible]

Theoretische [illegible] Coulomb

[illegible] El. [illegible] Gilbert [illegible] 1600 [illegible]

[illegible] el. [illegible]

[illegible] El. [illegible] Guericke

[illegible]

[illegible]

[illegible] Gray [illegible]

[illegible] el. [illegible] Hauksbee [illegible] El. [illegible]

[illegible] El.

Isolir[illegible]

Du Fay 1735 [illegible] El. [illegible] {± [illegible]

[illegible] El. [illegible]

Franklin [illegible] Hypoth. ; [illegible] fluidum

[illegible] ponder. Mat. ; [illegible] Mat. [illegible]

[illegible] ponder. Mat. [illegible]

[illegible] El. [illegible] ; [illegible] neg. el. [illegible] El. [illegible]

[illegible] + [illegible]

[illegible] El. [illegible] ; [illegible] ponder. [illegible]

[illegible] Grav. = Res. [illegible] pond. [illegible] El.

[illegible] Du Fay [illegible]

Symmer [illegible] (+ –) Theorie [illegible]

[illegible]

Coulomb [illegible] Theorie [illegible]

1736 [illegible], Genieoffizier [illegible] Martinique [illegible]

[illegible] Paris [illegible] mech. [illegible] math. [illegible] Theorie [illegible]

Gewölbe [illegible]. Theorie [illegible]

[illegible]

[illegible] Torsion [illegible]

[illegible] Torsion [illegible]

[illegible]

[illegible] Torsions[illegible]

[illegible]

[illegible] Dim. [illegible] 4ten Pot. [illegible]

[illegible] theor. [illegible] theor. [illegible] Elast.

[illegible] 1203. El.

[illegible] Grav. [illegible] el. [illegible]

16/10 Coulomb [illegible] el. [illegible]

r^2 [illegible]. Coulomb. [illegible]

Silberdraht

[illegible]

[illegible] elektr. [illegible]

[illegible]

[illegible]

T = Torsions coeff.

$T\alpha =$ [illegible]

l, α, p, d, e, e'

$$\frac{A}{d^n} = /$$

$$\frac{A\,p}{d^n} = T\alpha$$

$$p = l\cos\frac{\alpha}{2}$$

$$d = 2\,l\sin\frac{\alpha}{2}$$

$$\frac{A\,l\cos\frac{\alpha}{2}}{2^n l^n \sin^n\frac{\alpha}{2}} = T\alpha$$

$$\frac{A\,l}{2^n l^{n-1} T} = \alpha\sin^{n-1}\frac{\alpha}{2}\,tg\frac{\alpha}{2}$$ [illegible]

[illegible] 2te [illegible] $d\alpha$

[illegible] β [illegible]

e, β, γ

$$T(\gamma+\beta) = \frac{A\,l\cos\frac{\gamma}{2}}{2^n l^n \sin^n\frac{\gamma}{2}}$$

$$\left.\begin{aligned}\frac{A\,l}{2^n l^n T} &= (\beta+\gamma)\sin^{n-1}\frac{\gamma}{2}\,tg\frac{\gamma}{2}\\ \frac{A\,l}{2^n l^n T} &= (\beta'+\gamma')\sin^{n-1}\frac{\gamma'}{2}\,tg\frac{\gamma'}{2}\end{aligned}\right\}\ n = ?$$

[illegible] Coulomb [illegible] $n = 2$

[illegible] α [illegible]

[illegible] α [illegible]

[illegible]

[illegible] 100

[illegible] consequ. [illegible]

[illegible]

[illegible]

[illegible] $\varepsilon \frac{ee'}{r^2} = /$ [illegible]

[illegible]

[illegible] cm^3 [illegible] sec. [illegible]

$P = Mg$ $\quad M = 1 \quad g = 1 \quad P =$ [illegible]

[illegible] $= 1 = cm^3$ [illegible] $4°C$. [illegible] $= 1$ [illegible] $[cm]$ $s = 1$ $[sec]$

[illegible] Coulomb [illegible]

$\varepsilon \frac{e^2}{r^2}$ [illegible] $e = e'$ [illegible] $= 1$

$= / \qquad \frac{e^2}{r^2} = /$ [illegible] $e = r\sqrt{/}$

[illegible]

[illegible] $/ = 1$, $r = 1$ [illegible] $e = 1$

[illegible]

[illegible]

20/10 [illegible] Coul. [illegible]

X, Y, Z, abc, e, xyz

$\frac{e\,\varepsilon}{r^2} = /$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$r^2 = (x-a)^2 + (y-b)^2 + (z-c)^2$

$\cos\alpha = \frac{x-a}{r} \quad \cos\beta = \frac{y-b}{r} \quad \cos\gamma = \frac{z-c}{r}$

$$X = \frac{e\,\mathcal{E}}{r^2}\cos\alpha = \frac{e\,\mathcal{E}(x-a)}{r^3}$$

$$Y = \frac{e\,\mathcal{E}(y-b)}{r^3}$$

$$Z = \frac{e\,\mathcal{E}(z-c)}{r^3}$$

$$r\frac{dr}{dx} = x-a \qquad X = \frac{e\,\mathcal{E}}{r^2}\frac{dr}{dx} = -e\,\mathcal{E}\frac{d}{dx}\left(\frac{1}{r}\right) = -\frac{d}{dx}\left(\frac{e\,\mathcal{E}}{r}\right)$$

$$\frac{x-a}{r} = \frac{dr}{dx} \qquad Y = -\frac{d}{dy}\left(\frac{e\,\mathcal{E}}{r}\right) \qquad Z = -\frac{d}{dz}\left(\frac{e\,\mathcal{E}}{r}\right)$$

p Comp. [illegible]

$\frac{e\,\mathcal{E}}{r}$ = Potential [illegible]

x y z
$\mathcal{E}$
a b c
e
r
r_1
e_1
a_1
b_1
c_1

$$\frac{e\,\mathcal{E}}{r^2} \qquad \frac{e_1\,\mathcal{E}}{r_1^2}$$

$$X = \frac{e\,\mathcal{E}}{r^2}\,\frac{x-a}{r}$$

$$X_1 = \frac{e_1\,\mathcal{E}}{r_1^2}\,\frac{x-a_1}{r_1}$$

$X + X_1 =$ - - - -

$$r_1^2 = (x-a_1)^2 + (y-b_1)^2 + (z-c_1)^2$$

$$r_1\frac{dr_1}{dx} = x-a_1$$

$$\frac{dr_1}{dx} = \frac{x-a_1}{r_1} \qquad X_1 = \frac{e_1\,\mathcal{E}}{r_1^2}\frac{dr_1}{dx} = -\frac{d}{dx}\left(\frac{e_1\,\mathcal{E}}{r_1}\right)$$

$$X + X_1 = -\frac{d}{dx}\left(\frac{e\,\mathcal{E}}{r}\right) + \frac{d}{dx}\left(\frac{e_1\,\mathcal{E}}{r_1}\right)$$

$$= -\frac{d}{dx}\left(\frac{e\,\mathcal{E}}{r} + \frac{e_1\,\mathcal{E}}{r_1}\right)$$ [illegible] Pot. = Pot. [illegible]

[illegible]

$$\frac{e\,\mathcal{E}}{r} + \frac{e_1\,\mathcal{E}}{r_1} + \frac{e_2\,\mathcal{E}}{r_2} + \cdots = \Sigma\frac{e\,\mathcal{E}}{r}$$

$= \varrho \sum \frac{e}{r}$ [illegible] $\frac{e}{e} = 1$ [illegible] $\sum \frac{e}{r}$ = Pot. [illegible] ($= 1$)

[illegible]

[illegible]

$\sum \frac{e}{r} = U$ = Pot. [illegible] xyz

$X = -\frac{dU}{dx} \quad Y = -\frac{dU}{dy} \quad Z = \cdots$

[illegible] cont. [illegible] el. [illegible]

[illegible]

[illegible]

[illegible] Vol. [illegible] Vol. [illegible] $= \varrho$

dV = [illegible] Vol.
$\varrho\, dV = e$

[illegible] el. [illegible]

[illegible] el. [illegible]

[illegible] el. mult. [illegible] $= \sigma$

$\sigma\, dF = e$

[illegible] const. ; [illegible]

[illegible] $\int \frac{dV}{r}$ [illegible] ~~[illegible]~~ Vol. mult. [illegible]

[illegible]

Potential eines (sph. ?) :

$$U = \iint \frac{\varrho\, d\varphi\, d\psi \,.\, a^2 \sin\varphi}{d} =$$

$$= 2a^2\varrho\pi \int \frac{d\varphi \sin\varphi .}{\sqrt{a^2+p^2-2ap\cos\varphi}} =$$

$$= \frac{2a^2\varrho\pi}{2ap} \int \frac{d\varphi\, 2ap \sin\varphi}{\sqrt{}} =$$

$$= \frac{2a\varrho\pi}{p}\left[\sqrt{a^2+p^2-2ap\cos\varphi}\right]_0^{\pi}$$

$$= \frac{2a\varrho\pi}{p}\left[a+p-(a-p)\right] = 4a\varrho\pi \quad , \sim m \,($$

$$= \frac{2a\varrho\pi}{p}\left[a+p-(p-a)\right] = \frac{4a^2\varrho\pi}{p} , \sim m \,($$

22/10

$J = 4\pi a \sigma$

[illegible] $= \rho$

[illegible]

[illegible] $v r = a - \sigma$ [illegible] $\sigma + \varepsilon$

$U_0 = \Sigma 4\pi \sigma \rho \, \varepsilon = \qquad \varepsilon = ds$

$$\int_{a_0}^{a_1} 4\pi \rho \, s \, ds = 2\pi\rho \frac{s^2}{2} \Big|_{a_0}^{a_1} = 2\pi\rho \left[a_1^2 - a_0^2\right]$$

[illegible]

[illegible]

? [illegible]

[illegible] $v r = a_0, \mu$

[illegible] $v r = \mu, a_1$

$$(1) \quad \frac{\frac{4\pi}{3}\left[\mu^3 - a_0^3\right] \cdot \rho}{\mu} \qquad (2) = 2\pi\rho\left[a_1^2 - \mu^2\right]$$

$$U = \frac{4\pi}{3}\left[\mu^2 - \frac{a_0^3}{\mu}\right]\rho + 2\pi\rho\left[a_1^2 - \mu^2\right]$$

$$= 2\pi\rho a_1^2 - \frac{4\pi\rho}{3}\frac{a_0^3}{\mu} - \frac{2\pi\rho}{3}\mu^2$$

[illegible] $[$[illegible]$]$ $a_0 = 0$

$$U = 2\pi\rho a_1^2 - \frac{2\pi\rho}{3}\mu^2$$

$$\frac{dU}{d\mu} = -\frac{4\pi\rho}{3}\mu$$ [illegible]

$$U_1 = 2\pi\rho(a_1^2 - a_0^2)$$

$$U_2 = 2\pi\rho\, a_1^2 - \frac{4\pi\rho a_0^3}{3\rho} - \frac{2\pi\rho}{3}\rho^2$$

$$U_3 = \frac{\frac{4\pi\rho}{3}\left[a_1^3 - a_0^3\right]}{\rho}$$

a_1, a_0, 1, 2, 3

[illegible]

$\rho = a_0$ $U_1 = 2\pi\rho(a_1^2 - a_0^2)$ [illegible] U_2 [illegible] U_1

contin. [illegible]

$\rho = a_1$ [illegible] U_3 [illegible] U_2 [illegible] contin. [illegible]

2/ $\frac{dU_1}{d\rho} = 0$ $\frac{dU_2}{d\rho} = +\frac{4\pi\rho a_0^3}{3\rho^2} - \frac{4\pi\rho}{3}\rho$

$\frac{dU_3}{d\rho} = -\frac{4\pi\rho(a_1^3 - a_0^3)}{3\rho^2}$ [illegible] Diff. [illegible] cont.

[illegible]

[illegible] $r = 0$ [illegible] ∞ [illegible]

[illegible]

$$dV = \text{Vol. el.}$$

$$\iiint \frac{dV\rho}{r} = U \qquad r^2 d\omega$$

$$\int \frac{\rho\, r^2 d\omega\, dr}{r} = \text{Vol. elem.} = [illegible]$$

[illegible] Nenner [illegible] $r = 0$ [illegible] $= 0$

[illegible] $= \frac{\Sigma \text{ Vol. el.}}{[illegible]} = \frac{3\ [illegible]}{1\ [illegible]} = 2\ [illegible]$

[illegible] U

abc, xyz

$$u = \Sigma \frac{\rho\, dV}{r} \qquad r^2 = \sqrt{(a-x)^2 + (b-y)^2 + \ldots}$$

$$\frac{dU}{dx} = -\Sigma \frac{\rho\, dV}{r^2}\frac{dr}{dx}$$

$r\frac{dr}{dx} = -(a-x)$

$$\frac{dU}{dx} = +\sum \frac{\rho\, dV\,(a-x)}{r^3}$$ [illegible]

$(a-x) = r\cos\vartheta$ [illegible] $\frac{dU}{dx} = \sum \frac{\rho\, dV \cos\vartheta}{r^2}$ [illegible]

2ter [illegible]

$$\frac{d^2U}{dx^2} = \sum \rho\, dV \left[\frac{-1}{r^3} - \frac{(a-x).3}{r^4}\frac{dr}{dx}\right]$$

$$= \sum \rho\, dV \left[-\frac{1}{r^3} + \frac{3(a-x)^2}{r^5}\right]$$

[illegible] $r = 0$ [illegible] $= \infty$

[illegible]

23/10 $r^2 = (x-a)^2 + (y-b)^2 + (z-c)^2$

$$\frac{d}{dx}\left(\frac{1}{r}\right) = -\frac{1}{r^2}\frac{dr}{dx} = -\frac{x-a}{r^3}$$

$$\frac{d^2}{dx^2}\left(\frac{1}{r}\right) = -\frac{1}{r^3} + 3\frac{x-a}{r^4}\frac{dr}{dx} = -\frac{1}{r^3} + 3\frac{(x-a)^2}{r^5}$$

$$\frac{d^2}{dy^2}\left(\frac{1}{r}\right) = -\frac{1}{r^3} + 3\frac{(y-b)^2}{r^5}$$

$$\frac{d^2}{dz^2}\left(\frac{1}{r}\right) = -\frac{1}{r^3} + 3\frac{(z-c)^2}{r^5}$$

$$\frac{d^2}{dx^2}\left(\frac{1}{r}\right) + \frac{d^2}{dy^2}\left(\frac{1}{r}\right) + \frac{d^2}{dz^2}\left(\frac{1}{r}\right) = -\frac{3}{r^3} + 3\frac{1}{r^3} = 0$$

[illegible] $= 0$

[illegible]

$$U = \int \frac{\rho \, dV}{r}$$ [illegible]

$$\frac{d^2U}{dx^2} = \int \rho \, dV \frac{d^2}{dx^2}\left(\frac{1}{r}\right)$$

[illegible] $xyz = 0$

[illegible]

$$\frac{d^2U}{dx^2} + \frac{d^2U}{dy^2} + \frac{d^2U}{dz^2} = 0$$ [illegible] Laplace [illegible]

[illegible]

[illegible] U [illegible] Integ. [illegible]

[illegible]

$$U_2 = 2\pi\rho a_1^2 - \frac{2\pi\rho}{3}p^2 - \frac{4\pi\rho}{3}\frac{a_0^3}{p}$$

$a_0 = 0$, [illegible]

$$xyz \quad U_2 = 2\pi\rho a_1^2 - \frac{2\pi\rho}{3}p^2$$

$$p^2 = (x-\alpha)^2 + (y-\beta)^2 + (z-\gamma)^2$$

$$U_2 = 2\pi\rho a_1^2 - \frac{2\pi\rho}{3}\left[(x-\alpha)^2 + (y-\beta)^2 + (z-\gamma)^2\right]$$

$$\frac{dU_2}{dx} = -\frac{4\pi\rho}{3}(x-\alpha)$$

$$\frac{d^2U_2}{dx^2} = -\frac{4\pi\rho}{3} \qquad \frac{d^2U_2}{dy^2} = -\frac{4\pi\rho}{3} \qquad \frac{d^2U_2}{dz^2} = -\frac{4\pi\rho}{3}$$

$$\frac{d^2U_2}{dx^2} + \cdots\cdots = -4\pi\rho$$ [illegible]!

[illegible]

[illegible]:

%

[illegible]

1 P

[illegible] $U = U_1 + U_2$

$$\frac{d^2U}{dx^2} + \frac{d^2U}{dy^2} + \frac{d^2U}{dz^2} = \underbrace{\frac{d^2U_1}{dx^2} + \cdots}_{=0} + \underbrace{\frac{d^2U_2}{dx^2} + \cdots}_{=-4\pi\rho}$$

[illegible] U_1 [illegible] U_2 [illegible]

$\rho =$ [illegible] $= -4\pi\rho$

[illegible] constant [illegible] Laplace [illegible]

[illegible] $\rho = 0$; Poissonsche [illegible]

[illegible] Pot. [illegible] $= 0$ [illegible]

[illegible] $\frac{d^2U}{dx^2} + \frac{d^2U}{dy^2} + \frac{d^2U}{dz^2} = \Delta U$

[illegible]

$2\pi s\, ds =$ [illegible]

$$U = \int_{s=a_0}^{s=a_1} \frac{2\pi s\, ds\, \sigma}{\sqrt{x^2+s^2}} = 2\pi\sigma \sqrt{x^2+s^2}\Big|_{a_0}^{a_1} =$$

$$= 2\pi\sigma\left[\sqrt{x^2+a_1^2} - \sqrt{x^2+a_0^2}\right]$$

$a_0 = 0$ | $U = 2\pi\sigma\left[\sqrt{x^2+a_1^2} - \sqrt{x^2}\right]$ [illegible]

$U_+ = 2\pi\sigma\left[\sqrt{x^2+a_1^2} - x\right]$

$U_- = 2\pi\sigma\left[\sqrt{x^2+a_1^2} + x\right]$

$\Big|^{x=0}\ U = 2\pi\sigma a_1$

[illegible] cont. [illegible]:

$\frac{dU_+}{dx} = 2\pi\sigma\left[\frac{x}{\sqrt{x^2+a_1^2}} - 1\right]$ $\qquad \frac{dU_-}{dx} = 2\pi\sigma\left[\frac{x}{\sqrt{x^2+a_1^2}} + 1\right]$

[illegible]

[illegible] $x = +0$: $\frac{dU_+}{dx} = -2\pi\sigma$ | $x = -0$: $\frac{dU_-}{dx} = +2\pi\sigma$

$\frac{dU_+}{dx} - \frac{dU_-}{dx} = -4\pi\sigma$ [illegible]

[illegible] 1 [illegible] 2 [illegible]

[illegible] $U_1 = U_1' + U_1''$ [illegible] 1

$U_2 = U_2' + U_2''$ [illegible] 2

$\frac{dU_2}{dx} = \frac{dU_2'}{dx} + \frac{dU_2''}{dx}$

$\frac{dU_1}{dx} = \frac{dU_1'}{dx} + \frac{dU_1''}{dx}$

$\frac{dU_2}{dx} - \frac{dU_1}{dx} = \frac{dU_2'}{dx} - \frac{dU_1'}{dx} + \frac{dU_2''}{dx} - \frac{dU_1''}{dx}$

$\frac{dU_2''}{dx} - \frac{dU_1''}{dx} = -4\pi\sigma$

dU' [illegible] const. [illegible] $= 0$ [illegible]

[illegible] X [illegible] Norm. [illegible]

$\frac{dU_2}{dN} - \frac{dU_1}{dN} = -4\pi\sigma$

27/10 Vertheilung [illegible]

El. [illegible] Vertheilung [illegible] = Influenz

Cylinder [illegible] Glaskugel

+ K −

L

[illegible] L + [illegible] K − [illegible]

K [illegible]

[illegible]

$r \rightarrow$ [illegible]

K

[illegible]

$X = 0 \quad -\frac{\partial V}{\partial x} = 0 \quad -\frac{\partial V}{\partial y} = 0 \quad -\frac{\partial V}{\partial z} = 0$

[illegible] Pot. [illegible] const.

$$\frac{d^2U}{dx^2}+\frac{d^2U}{dy^2}+\frac{d^2U}{dz^2}=-4\pi\rho \qquad r = \text{const}$$

$$0=-4\pi\rho$$

$\rho = 0$ [illegible]

sp. Fall:

$Q =$ [illegible]

$$\sigma = \frac{Q}{4\pi a^2} \qquad P = \text{Pot.} \ [illegible] \qquad P = 4\pi a \sigma$$

$$P = \frac{Q}{a} \qquad Q = aP$$ [illegible] Pot.

— [illegible] const. Pot. galvanische Elem. [illegible] Pot. [illegible]

$\frac{Q}{P} = a =$ Capacität [illegible] $=$ [illegible] $\times$ [illegible]

dS r r

[illegible] ; r [illegible] const.

$dS =$ [illegible]

$$U = \int \frac{\sigma\, dS}{r} \qquad Q = \int \sigma\, dS$$

$$U = \frac{Q}{L} \qquad Q = L \cdot U$$

$L =$ [illegible] $=$ Capac. [illegible]

Capacität:

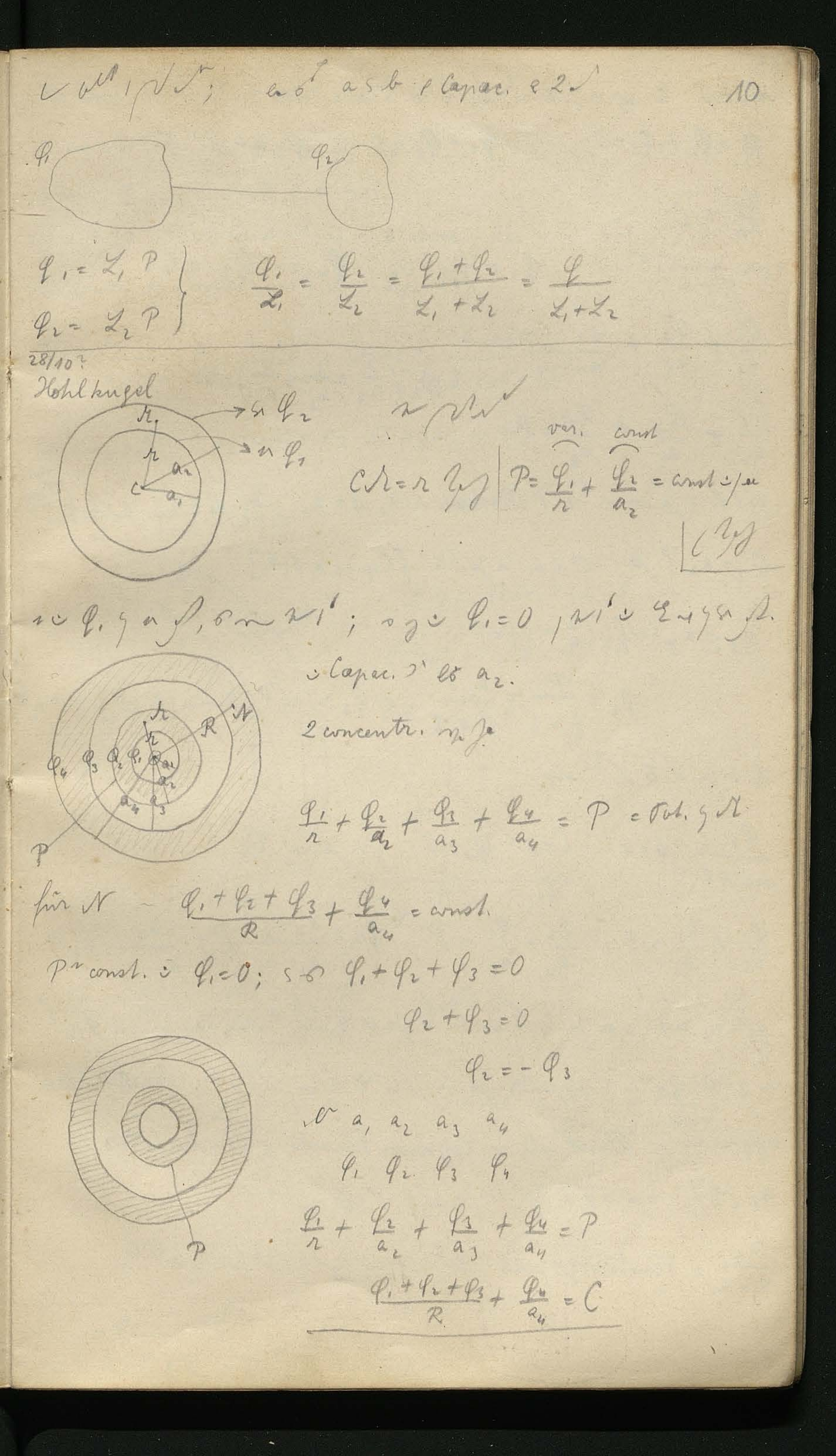
Q a b K_1 K_2

[illegible] K_2 [illegible] K_1 [illegible] Q_1 [illegible] K_1 [illegible] Q_2 [illegible] K_2.

[illegible]

Pot. [illegible] Q_1 [illegible] K_1 = Pot. [illegible] Q_2 [illegible] K_2

$$\frac{Q_1}{a} = \frac{Q_2}{b} = \quad \boxed{\frac{Q_1}{Q_2} = \frac{a}{b}} \quad = \frac{Q_1+Q_2}{a+b} = \frac{Q}{a+b} = P \ [illegible]$$



10
Capac.
φ1 = L1 P
φ2 = L2 P
φ1/L1 = φ2/L2 = (φ1 + φ2)/(L1 + L2) = φ/(L1 + L2)
28/10
Hohlkugel
ver.
const
P = φ1/r + φ2/a2 = const
φ1 = 0
Capac.
a2
2 concentr.
φ1/r + φ2/a2 + φ3/a3 + φ4/a4 = P
für N
(φ1 + φ2 + φ3)/R + φ4/a4 = const.
P const.
φ1 = 0
φ1 + φ2 + φ3 = 0
φ2 + φ3 = 0
φ2 = − φ3
a1 a2 a3 a4
φ1 φ2 φ3 φ4
φ1/r + φ2/a2 + φ3/a3 + φ4/a4 = P
(φ1 + φ2 + φ3)/R + φ4/a4 = C

$Q_1 = 0$

$Q_1 + Q_2 + Q_3 = 0$ —— $Q_2 + Q_3 = 0$ $Q_3 = -Q_2$

$\frac{Q_4}{a_4} = C$

1). [illegible] —— $Q_3 + Q_4 = 0$ $Q_4 = -Q_3 = Q_2$

$\frac{Q_2}{a_2} + \frac{Q_3}{a_3} + \frac{Q_4}{a_4} = P$ $Q_2\left(\frac{1}{a_2} - \frac{1}{a_3} + \frac{1}{a_4}\right) = P$

$\frac{Q_2}{a_2} + \frac{Q_2}{a_3} + \frac{Q_2}{a_4} = P$

[illegible] Radien a_1 / $= a_2$, a_3 / $= a_4$, [illegible] $Q_2 \frac{1}{a_2} = P$

$Q_2 = a_2 P$ / ; [illegible] [Capac × Pot.]

$a_3 < a_4$ | $Q_2\left(\frac{1}{a_2} - \varepsilon\right) = P$

$Q_2 = \frac{P}{\frac{1}{a_2} - \varepsilon} = \frac{a_2 P}{1 - a_2 \varepsilon}$ [illegible] $Q_2 > a_2 P$; [illegible] ε [illegible] $Q_2 = a_2 P$;

2). [illegible]

$\frac{Q_4}{\text{rad. d. } \ldots}$ / $= 0$ $C = 0$ $Q_4 = 0$ [illegible] ε

$\frac{Q_2}{a_2} + \frac{Q_3}{a_3} = P$; $\frac{Q_2}{a_2} - \frac{Q_2}{a_3} = P$; $Q_2 = \frac{a_2 a_3}{a_3 - a_2} P = \frac{a_3}{a_3 - a_2} a_2 P$

$\frac{a_3}{a_3 - a_2} > 1$ [illegible]; $a_3 - a_2$ [illegible] 1 [illegible]

[illegible] Q_2 [illegible] concentr. [illegible]; Verstärkgs-apparat = Kleist'sche [illegible] Leydner Flasche = Condensator.

a_1 [illegible] $= 0$ [illegible]

$\frac{a_3}{a_3 - a_2}$ = Verstärkgszahl [illegible] $a_3 - a_2$ [illegible].

[illegible] Cond. [illegible] P [illegible] Σ. $\varphi_3 = -\varphi_2$

[illegible] φ_2 [illegible] φ_3 [illegible]

Anm: Σ [illegible] const. Pot. [illegible]

[illegible] Σ [illegible] Conduct. [illegible] Pot. [illegible]

Condensat. [illegible] Messapparate [illegible] Cap. [illegible]

$$\varphi_2 = \frac{a_2 a_3}{a_3 - a_2} \cdot P \; ; \quad \frac{a_2 a_3}{a_3 - a_2} = \text{Capac} = \frac{a_2 a_3}{[illegible]}$$

$a_3 - a_2 = \Delta$ [illegible] a_2 [illegible] $= a_3$, [illegible] $a_2 a_3$ [illegible] $= a^2$

29/10:

$$C = \frac{a^2}{\Delta} = \frac{4\pi a^2}{4\pi\Delta} = \frac{F}{4\pi\Delta}$$; Condens. [illegible]

N, n, e, P, isol.

nN = Norm. [illegible]

Potent. [illegible] nN [illegible], [illegible]

Pot. [illegible]

P, n, N

1.) n — $\left(\frac{dV}{dn}\right)_+ = -\frac{P}{\Delta}$ $nN = \Delta$

$$\left(\frac{dV}{dn}\right)_- = 0 \qquad -4\pi\sigma = \left(\frac{dV}{dn}\right)_+ - \left(\frac{dV}{dn}\right)_-$$

$$= -\frac{P}{\Delta}$$

$$\sigma = \frac{P}{4\pi\Delta}$$

2).

$$-4\pi\sigma' = +\frac{P}{\Delta}$$

[illegible] 1.) $+\Sigma$, [illegible] 2.) $-\Sigma$, [illegible]

$F = $ [illegible]

$P\sigma = \frac{FP}{4\pi\Delta} = Q \qquad \frac{F}{4\pi\Delta} = C$ [illegible]

Capac. [illegible] (Faraday)

[illegible] e Rad.

Rad.: $a_1\ a_2\ a_3\ a_4\ a_5\ a_6$

$Q_1 \text{ ------ } Q_6$

$M = \frac{Q_1}{r} + \frac{Q_2}{a_2} + \frac{Q_3}{a_3} + \frac{Q_4}{a_4} + \frac{Q_5}{a_5} + \frac{Q_6}{a_6} = P_{const}$

$r = OM$

[illegible] $\frac{Q_1+Q_2+Q_3}{r'} + \frac{Q_4}{a_4} + \frac{Q_5}{a_5} + \frac{Q_6}{a_6} = P'_{const}$

$r' = OM'$

$r'' = OM'' \qquad \frac{Q_1+Q_2+Q_3+Q_4+Q_5}{r''} + \frac{Q_6}{a_6} = P''_{const}$

$Q_1 = 0,\ Q_1 + Q_2 + Q_3 = 0,\ Q_1 + Q_2 + Q_3 + Q_4 + Q_5 = 0$

$Q_2 + Q_3 = 0 \qquad Q_4 + Q_5 = 0$

$Q_2 = -Q_3 \qquad Q_4 = -Q_5$

3 [illegible] $\qquad P'' = 0 \qquad \frac{Q_6}{a_6} = 0 \quad Q_6 = 0$

2 " [illegible]

auch $Q_3 + Q_4 = 0$ [illegible]

[illegible $= 0$]

$Q_3 = -Q_2;\ Q_4 = -Q_3 = +Q_2;\ Q_5 = -Q_4 = -Q_2$

[illegible] P

$\frac{Q_2}{a_2} - \frac{Q_2}{a_3} + \frac{Q_2}{a_4} - \frac{Q_2}{a_5} = P$

$Q_2\left[\frac{1}{a_2} - \frac{1}{a_3} + \frac{1}{a_4} - \frac{1}{a_5}\right] = P$

$Q_2\left[\frac{a_3 - a_2}{a_2 a_3} + \frac{a_5 - a_4}{a_4 a_5}\right] = P$

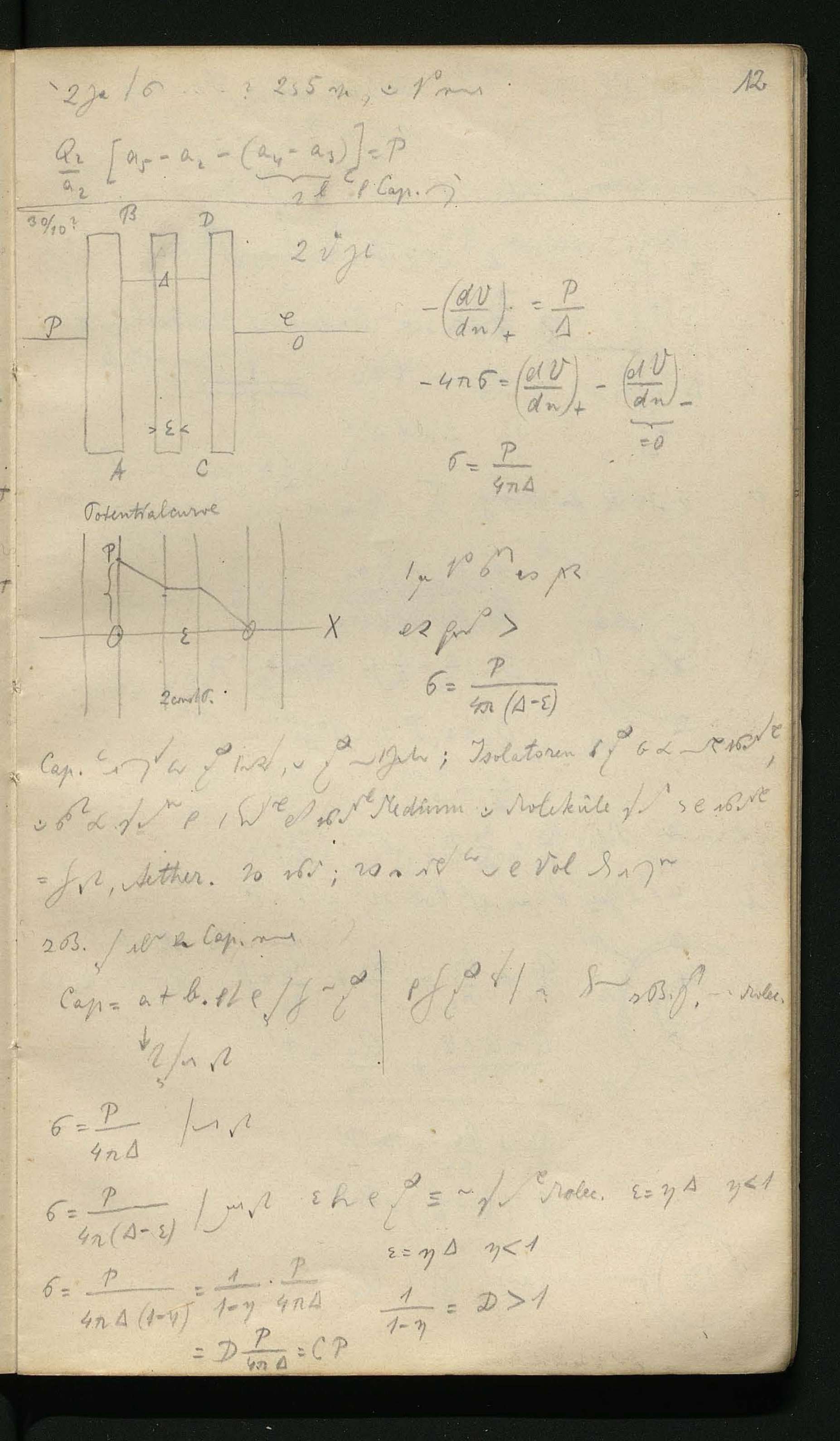
$\frac{Q_2}{R^2}\left[a_3 - a_2 + a_5 - a_4\right] = P$

[illegible] 2 Isolatoren

Rad. [illegible]:

$a_2 a_3 = a^2 \qquad a$ [illegible] $\left(\frac{a_2}{a_3}\right)$

$a_4 a_5 = a^2 \qquad$ " $\left(\frac{a_4}{a_5}\right)$



2 [illegible] ? 235 [illegible]

$$\frac{a_2}{a_2}\left[a_5 - a_2 - (a_4 - a_3)\right] = P$$

30/10?

2 [illegible]

$$-\left(\frac{dV}{dn}\right)_+ = \frac{P}{\Delta}$$

$$-4\pi\sigma = \left(\frac{dV}{dn}\right)_+ - \underbrace{\left(\frac{dV}{dn}\right)_-}_{=0}$$

$$\sigma = \frac{P}{4\pi\Delta}$$

Potentialcurve

[illegible]

$$\sigma = \frac{P}{4\pi(\Delta - \varepsilon)}$$

Cap. [illegible]; Isolatoren [illegible] Medium [illegible] Moleküle [illegible] Aether. [illegible] Vol [illegible]

2 B. [illegible] Cap. [illegible]

Cap = a + b. [illegible] | [illegible] molec.

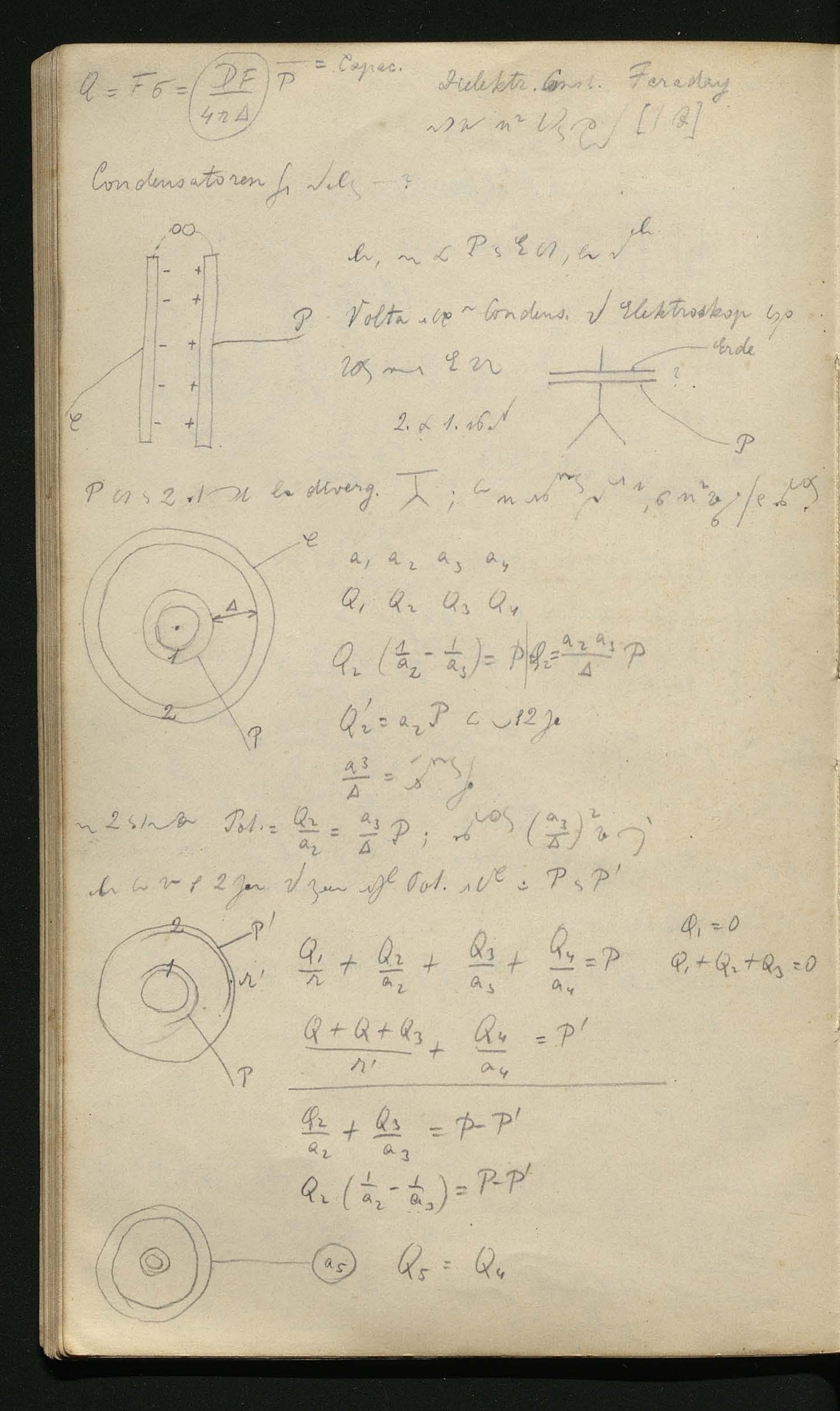
$$\sigma = \frac{P}{4\pi\Delta} \quad \text{[illegible]}$$

$$\sigma = \frac{P}{4\pi(\Delta - \varepsilon)} \quad \text{[illegible]} \; \varepsilon \; \text{[illegible] molec.} \quad \varepsilon = \eta\Delta \quad \eta < 1$$

$$\varepsilon = \eta\Delta \quad \eta < 1$$

$$\sigma = \frac{P}{4\pi\Delta(1-\eta)} = \frac{1}{1-\eta} \cdot \frac{P}{4\pi\Delta} \qquad \frac{1}{1-\eta} = D > 1$$

$$= D\frac{P}{4\pi\Delta} = CP$$



$Q = F\sigma = \left(\frac{DF}{4\pi\Delta}\right) \overline{P}$ = Capac.

Dielektr. Const. Faraday [1 8]

Condensatoren

Volta Condens. Elektroskop

Erde

$Q_1 \; Q_2 \; Q_3 \; Q_4$

$a_1 \; a_2 \; a_3 \; a_4$

$Q_2\left(\frac{1}{a_2} - \frac{1}{a_3}\right) = P \quad Q_2 = \frac{a_2 a_3}{\Delta} P$

$Q_2' = a_2 P$

$\frac{a_3}{\Delta}$

Pot. $= \frac{Q_2}{a_2} = \frac{a_3}{\Delta} P$; $\left(\frac{a_3}{\Delta}\right)^2$

Pot. : P, P'

$\frac{Q_1}{r} + \frac{Q_2}{a_2} + \frac{Q_3}{a_3} + \frac{Q_4}{a_4} = P$

$Q_1 = 0$

$Q_1 + Q_2 + Q_3 = 0$

$\frac{Q + Q + Q_3}{r'} + \frac{Q_4}{a_4} = P'$

$\frac{Q_2}{a_2} + \frac{Q_3}{a_3} = P - P'$

$Q_2\left(\frac{1}{a_2} - \frac{1}{a_3}\right) = P - P'$

$Q_5 = Q_4$

Influenz.

[illegible]

$+\mathfrak{E}$ [illegible] : $r\,\mathfrak{E} = s$

$\frac{\mathfrak{E}}{s}$ [illegible]

[illegible]

$\frac{\mathfrak{E}}{s} + U = C$ const [illegible]

$\frac{\mathfrak{E}}{s} + U_i = C$

$$U_i = C - \frac{\mathfrak{E}}{s} = C - \frac{\mathfrak{E}}{\sqrt{p^2+r^2-2rp\cos\theta}}$$

$$-4\pi\sigma = \frac{dU_e}{dn} - \frac{dU_i}{dn}$$

$$= \frac{dU_e}{dr} - \frac{dU_i}{dr}$$

$=$ $\mathfrak{E}$ [illegible] U_i [illegible] U_e [illegible] geom. Methode

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[illegible]

$\sigma\, dF \qquad \frac{\sigma\, dF}{s} = $ [illegible]

$$\int \frac{\sigma\, dF}{s} = U_i = \text{[illegible]}$$

$s^2 = a^2 + r^2 - 2ar\cos\varphi$ [illegible] $a > r$

$$U_i = \int \frac{\sigma\, dF}{\sqrt{a^2 + r^2 - 2ar\cos\varphi}}$$

$$= \frac{1}{a} \int \frac{\sigma\, dF}{\sqrt{1 - \frac{2r}{a}\cos\varphi + \frac{r^2}{a^2}}}$$

$$\frac{1}{\sqrt{1 - \frac{2r}{a}\cos\varphi + \frac{r^2}{a^2}}} = 1 + P_1 \frac{r}{a} + P_2 \frac{r^2}{a^2} + \cdots$$

P_1 [illegible] $\cos\varphi$ [illegible] funct. [illegible] $\cos\varphi$

Heine: (2 [illegible])

$$U_i = \frac{1}{a} \int \sigma\, dF \left[1 + P_1 \frac{r}{a} + P_2 \frac{r^2}{a^2} + \cdots \right]$$

$$= \frac{1}{a} \left\{ \int \sigma\, dF + \frac{r}{a} \int P_1 \sigma\, dF + \frac{r^2}{a^2} \int P_2 \sigma\, dF + \cdots \right\}$$

$$= \frac{1}{a} \left\{ Q_0 + \frac{r}{a} Q_1 + \frac{r^2}{a^2} Q_2 + \cdots \right\}$$

$Q_0\ Q_1 \ldots$ [illegible]

$Q_0 =$ [illegible]

[illegible] $r > a$

$$U_e = \int \frac{\sigma\, dF}{\sqrt{a^2 + r^2 - 2ar\cos\varphi}} = \frac{1}{r} \int \frac{\sigma\, dF}{\sqrt{1 - 2\frac{a}{r}\cos\varphi + \frac{a^2}{r^2}}} =$$

$$= \frac{1}{r} \int \sigma\, dF \left[1 + P_1 \frac{a}{r} + P_2 \frac{a^2}{r^2} + \cdots \right]$$

$$U_e = \frac{1}{r}\left\{ Q_0 + \frac{a}{r} Q_1 + \frac{a^2}{r^2} Q_2 + \cdots \right\}$$

U_i u. U_e [illegible] $\frac{1}{a}$ — $\frac{1}{r}$; [illegible]

$$U_i = \frac{1}{a} f\left(\frac{r}{a}\right) \qquad U_e = \frac{1}{r} f\left(\frac{a}{r}\right)$$ [illegible]

[illegible]

[illegible] $U_i = \frac{1}{a} C \qquad U_e = \frac{1}{r} C$

---

r, ϑ, O, p, e

[illegible] $U_i + \frac{e}{r_e} = C$

[illegible]

$$U_i = c - \frac{e}{\sqrt{p^2 + r^2 - 2pr\cos\vartheta}}$$

$$= c - \frac{e}{\sqrt{p^2 + a^2\frac{r^2}{a^2} - 2pa\frac{r}{a}\cos\vartheta}}$$

$$= \frac{ac}{a} - \frac{e}{a\sqrt{\frac{p^2}{a^2} + \frac{r^2}{a^2} - 2\frac{p}{a}\frac{r}{a}\cos\vartheta}}$$

$$U_e = \frac{ca}{r} - \frac{e}{r\sqrt{\frac{p^2}{a^2} + \frac{a^2}{r^2} - 2\frac{p}{a}\frac{a}{r}\cos\vartheta}}$$

$$= \frac{ca}{r} - \frac{e}{\sqrt{\frac{p^2 r^2}{a^2} + a^2 - 2pr\cos\vartheta}}$$ | $r = a$ [illegible] $U_i = U_e$ [illegible]

$$-\frac{4\pi\sigma}{m} = \left(\frac{dU_e}{dr} - \frac{dU_i}{dr}\right)_{r=a}$$

$$-4\pi\sigma = -\frac{ca}{a^2} + \frac{e\left[\frac{p^2 r}{a^2} - p\cos\vartheta\right]}{\left[\frac{p^2 r^2}{a^2} + a^2 - 2pr\cos\vartheta\right]^{\frac{3}{2}}} + ca -$$

$$- \frac{e\left[r - p\cos\vartheta\right]}{\left[p^2 + r^2 - 2pr\cos\vartheta\right]^{\frac{3}{2}}}$$ | $r = a$ [illegible]

$$-4\pi\sigma = -\frac{c}{a} + \frac{\mathfrak{E}\left(\frac{p^2}{a} - p\cos\vartheta\right)}{(p^2+a^2-2pa\cos\vartheta)^{\frac{3}{2}}} - \frac{\mathfrak{E}(a - p\cos\vartheta)}{(p^2+a^2-2pa\cos\vartheta)^{\frac{3}{2}}}$$

$$4\pi\sigma = +\frac{c}{a} + \frac{\mathfrak{E}}{a}\cdot\frac{p^2-a^2}{(p^2+a^2-2pa\cos\vartheta)^{\frac{3}{2}}}$$

[illegible] $C = 0$

$$4\pi\sigma = -\frac{\mathfrak{E}}{a}\,\frac{p^2-a^2}{(\qquad)^{\frac{3}{2}}} \qquad p > a$$

[illegible]

p, ϑ, 0, $\mathfrak{E}$

$$4\pi\sigma = -\frac{\mathfrak{E}}{a}\,\frac{(p^2-a^2)}{(r\mathfrak{E})^3}$$

[illegible] El. [illegible]

[illegible]

[illegible] $= (p+a)^3 : (p-a)^3$

[illegible] $p = 2a \,|\, \sigma = 27 : 1$ [illegible] El. [illegible]

[[illegible]] [illegible] $c \,|\, = 0$, [illegible] neg. [illegible]

[illegible] El. [illegible]

[illegible] neg. [illegible]

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σ, ϑ, $\mathfrak{E}$, + + + + + + + − − − −

$$U_i = c - \frac{\mathfrak{E}}{\sqrt{p^2+r^2-2pr\cos\vartheta}}$$

$$U_e = \frac{ca}{r} - \frac{\mathfrak{E}a}{r\sqrt{p^2+\frac{a^4}{r^2}-2\frac{a^2p}{r}\cos\vartheta}}$$

$r = \infty$

$$U_e = \frac{ca}{r} - \frac{\mathfrak{E}a}{rp}$$

Pot. e + El. [illegible] Pot. [illegible]

[illegible] Pot. [illegible]

$C_a = \frac{e_a}{r} = e = $ [illegible] [illegible] $\frac{e}{R} = p \frac{1}{R}$ [illegible]

[illegible shorthand]

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[illegible shorthand]

$C = \frac{e}{p}$ [illegible shorthand]

$$4\pi\sigma = -\frac{e}{a}\frac{(p^2-a^2)}{(R e)^3} + \frac{c}{a}$$

[illegible shorthand] $= 0$

$$4\pi\sigma = 0 = \frac{e}{pa} - \frac{e(p^2-a^2)}{a R e^3}$$

$$R e^3 = p(p^2-a^2)$$

$$R e = \sqrt{p^2+a^2-2ap\cos\vartheta} = \sqrt[3]{p(p^2-a^2)}$$

$$p^2+a^2-2ap\cos\vartheta = \sqrt[3]{p^2(p^2-a^2)^2}$$

$$2ap\cos\vartheta = p^2+a^2-\sqrt[3]{p^2(p^2-a^2)^2}$$

[illegible] $p = 2a$

$$4a^2\cos\vartheta = 5a^2 - \sqrt[3]{36a^6}$$

$$\cos\vartheta = \frac{5-\sqrt[3]{36}}{4} = \frac{5-3{\cdot}3}{4} = \frac{1{\cdot}7}{4} = 0{\cdot}425$$

$\vartheta = 65°$ [illegible shorthand]

[illegible shorthand] $\cos\vartheta = 0$ [illegible] $\vartheta = 90°$

$$U_e = \frac{e a}{r p} - \frac{e a}{\sqrt{p^2 r^2 + a^4 - 2a^2 p r\cos\vartheta}}$$

$$= \frac{e a}{r p} - \frac{e a}{p\sqrt{r^2 + \frac{a^4}{p^2} - 2\frac{a^2}{p} r\cos\vartheta}} \quad \Big| \frac{a^2}{r} = x$$

$$= \dots \frac{\quad}{p\sqrt{r^2+x^2-2rx\cos\vartheta}}$$

[shorthand]

[shorthand]

[shorthand] $\frac{Ea}{\rho}$ [shorthand]

[shorthand] B concent.

[shorthand]

[shorthand] E [shorthand] E convent.*

[shorthand] B [shorthand] Bild von E [shorthand]

[shorthand] E induc. [shorthand] induc. [shorthand] $-\frac{Ea}{\rho}$ [shorthand]

[shorthand]

[shorthand] E [shorthand]

[shorthand] $U_e' + U_i'' + \frac{E}{\sqrt{\rho^2+r^2-2\rho r\cos\vartheta}} = \text{const.}$

$$U_i'' = ~~\frac{\varphi_0}{a} + \frac{\varphi_1 r}{a} + \frac{\varphi_2 r^2}{a^2}~~ \; \frac{1}{a}\left[\varphi_0'' + \varphi_1''\frac{r}{a} + \varphi_2''\frac{r^2}{a^2} + \dots\right]$$

Pot. [shorthand]

$$U_e' = \frac{1}{r}\left[\varphi_0' + \varphi_1'\frac{b}{r} + \varphi_2'\frac{b^2}{r^2} + \dots\right]$$

$$\frac{E}{\sqrt{\rho^2+r^2-2\rho r\cos\vartheta}} = \frac{E\left(1-\frac{2r}{\rho}\cos\vartheta+\frac{r^2}{\rho^2}\right)^{-\frac{1}{2}}}{\rho} =$$

$$= \frac{E}{\rho}\left[1 + \frac{P_1 r}{\rho} + \frac{P_2 r^2}{\rho^2} + \dots\right]$$

$$\frac{1}{r}\left\{\varphi_0' + \varphi_1'\frac{b}{r} + \dots\right\} + \frac{1}{a}\left\{\varphi_0'' + \varphi_1''\frac{r}{a} + \dots\right\} + \frac{E}{\rho}\left\{1 + \frac{P_1 r}{\rho} + \frac{P_2 r^2}{\rho^2} + \dots\right\} = C$$

[shorthand] Pot. [shorthand]

[shorthand] constante reducirt

$Q_0' = 0 \quad Q_1' = 0 \quad Q_2' = 0 \ldots$

$\frac{1}{a} Q_0'' + \frac{\varepsilon}{p} = C$

$\frac{Q_1''}{a^2} + \frac{\varepsilon P_1}{p^2} = 0$ etc.

[illegible] Integ. [illegible] [illegible] Pot. $= 0$ [illegible]

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[illegible]

U_e' [illegible] $\quad U_i''$ [illegible]

$$U_e' + U_i'' + \frac{\varepsilon}{\sqrt{p^2 + r^2 - 2pr\cos\theta}} = C$$

$p = O\varepsilon$

$U_e' = \frac{Q'}{r} + \frac{Q_1'}{r^2} + \ldots$ [illegible]

$U_i'' = \frac{Q''}{a} + \frac{Q_1''}{a^2} r + \ldots$

$$\frac{\varepsilon}{\sqrt{p^2 + r^2 - 2pr\cos\theta}} = \frac{\varepsilon}{r\sqrt{1 - \frac{2p}{r}\cos\theta + \frac{p^2}{r^2}}} = \frac{\varepsilon}{}$$

$$= \frac{\varepsilon}{r}\left[1 + P_1 \frac{p}{r} + P_2 \frac{p^2}{r^2} + \ldots\right]$$

[illegible] const. [illegible] Potential [illegible]

$\frac{Q''}{a} = C \quad Q' + \varepsilon = 0 \quad Q_1'' = 0 \quad Q_2'' = 0 \ldots$

$Q_1' + \varepsilon P_1 p = 0$

$U_i'' =$ const. [illegible] const. $= 0$ [illegible]

[illegible] ε.

[illegible] conc.

[illegible] 3 Ochs [illegible]

[illegible]

[illegible] Schirm [illegible]

[illegible] [3 Ochs [illegible]] [illegible]

[illegible]

$$U'_e = -\frac{e}{\sqrt{p^2+r^2-2pr\cos\theta}} = -\frac{e}{r\sqrt{\frac{p^2 b^2}{b^2 r^2}+1-2\frac{p b}{b r}\cos\theta}} \qquad \frac{1}{r} f\left(\frac{b}{r}\right)$$

$$U'_i = -\frac{e}{b\sqrt{\frac{p^2}{b^4}r^2+1-2\frac{p}{b^2}r\cos\theta}}$$

$$-4\pi\sigma = \left[\frac{dU'_e}{dr} - \frac{dU'_i}{dr}\right]_{r=b}$$

$$= \left[\frac{\varepsilon(r-p\cos\theta)}{[p^2+r^2-2pr\cos\theta]^{\frac{3}{2}}} - \frac{\varepsilon\left(\frac{p^2}{b^4}r - \frac{p}{b^2}\cos\theta\right)}{b\left[\frac{p^2}{b^4}r^2+1-2\frac{pr}{b^2}\cos\theta\right]^{\frac{3}{2}}}\right]_{r=b}$$

$$= \frac{\varepsilon(b-p\cos\theta)}{[p^2+b^2-2pb\cos\theta]^{\frac{3}{2}}} - \frac{\varepsilon\left[\frac{p^2}{b}-p\cos\theta\right]}{b^3\left[\frac{p^2}{b^2}+1-\frac{2p}{b}\cos\theta\right]^{\frac{3}{2}}} =$$

$$-4\pi\sigma = \frac{\varepsilon\left[b^2-\frac{p^2}{b}\right]}{[p^2+b^2-2pb\cos\theta]^{\frac{3}{2}}}$$ [illegible]

[illegible] $r=\infty$

$U_e = -\frac{\varepsilon}{r}$ [illegible] $-\varepsilon = 2\sigma$ [illegible]

[illegible]:

$$-4\pi\sigma = \frac{\varepsilon(p^2-a^2)}{a(\sqrt{\ })^3}$$

$$= \frac{\varepsilon(p^2-a^2)}{a[p^2+a^2-2ap\cos\theta]^{\frac{3}{2}}}$$

[illegible]

$p - a = f$ $$4\pi\sigma = -\frac{\varepsilon f(f+2a)}{a[(a+f)^2+a^2-2a(a+f)\cos\theta]^{\frac{3}{2}}}$$

$a=\infty$

$$4\pi\sigma = \frac{2\varepsilon f}{[a^2+2af+f^2+a^2-2a^2\cos\theta-2af\cos\theta]^{\frac{3}{2}}}$$

[illegible]

$$\frac{2\varepsilon f}{f^3} = \frac{2\varepsilon}{f^2}$$

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O, B, p', f', f, r, E

$$4\pi\sigma = -\frac{E(p^2-a^2)}{a(rE)^3}$$

[illegible]

$p = a+f$

$$= -\frac{Ef(2a+f)}{(rE)^3} = -\frac{2af\,E}{a\,rE^3}$$

$a = \infty$ [illegible]

r, E, f', f

[illegible] 3 Pol. [illegible]

[illegible]

$\frac{Ea}{r}$ = [illegible]

$$\frac{Ea}{(a+f)} = E$$ [illegible]

[illegible]

$p = a+f$

$p' = a-f'$

$pp' = a^2$

$(a+f)(a-f') = a^2$

$a^2 + af - af' - ff' = a^2$

$f = f'$

[illegible]

[illegible] [... $r = \infty$]

[illegible]

[illegible]

~~[illegible]~~ [illegible]

[illegible]

[illegible]

[illegible] Optik

r r' e' e

[illegible]

[illegible] Compr. [illegible] Eben [illegible]

[illegible] Resu [illegible]

[illegible] refl.

[illegible]

r h e g f

[illegible] Pot. [illegible] U_e

$$U_e + \frac{e}{(er)} = 0$$ [illegible]

$$U_e = -\frac{e}{\sqrt{(f+g)^2+h^2}}$$

$$\frac{dU_e}{dg} = \frac{+(f+g)\,e}{\left[(f+g)^2+h^2\right]^{\frac{3}{2}}}$$

[illegible]

$$\frac{dU_r}{dg} = -\frac{dU_e}{dg}$$

$$-4\pi\sigma = \left|\frac{dU_e}{dg} - \frac{dU_r}{dg}\right|_{g=0}$$

$$= 2\frac{dU_e}{dg}\Big|_{g=0} = \frac{2f}{(f^2+h^2)^{\frac{3}{2}}}$$ [illegible] $\sqrt{f^2+h^2}$ = [illegible]

[illegible] germ. [illegible] Pot.

m m' m'' a b c r x y z

[illegible] Pot. [illegible] xyz [illegible] abc [illegible]

$$U = f(x\,y\,z)$$

[illegible] const.

[illegible] $U = \text{const.}$ [illegible] (xyz) [illegible]

[illegible]

[illegible] Pot. [illegible]

[illegible] Niveaufläche; [illegible]

[illegible] $r r' = 0$ [[illegible] const. Pot.]

[illegible] Comp. [illegible] $r r'$ [illegible]

[illegible] r' [illegible] Pot. [illegible] r

[illegible] $r' =$ [illegible] $\frac{\text{Pot.}}{r r'}$

[illegible] Niveaufl. [illegible]

[illegible]

[illegible] Niveaufl. [illegible]

[illegible] N. F. [illegible]

[illegible]

[illegible] Norm. [illegible]

[illegible] Curve; [illegible]

[illegible]

[illegible] Kraftlinie

= orthogonale Trajectorie [illegible]

[illegible]

[illegible] Niveaufl. [illegible]

[illegible] Kraftlinien [illegible] RV

$\frac{r}{r} = \text{const.}$

[illegible]

13/11 [illegible] $\partial F = $ [illegible] $\frac{m}{r^2} = 1$

$$\sum \frac{m}{r^2} \partial F = \frac{m}{r^2} 4\pi r^2 = 4\pi m$$ [illegible]

[illegible]:

N' [illegible]

NL [illegible] ON [illegible]

$$\frac{m}{(ON)^2}$$

$$\overline{rr'} : \overline{NL} = OM^2 : ON^2$$

$$\overline{rr'} = \frac{OM^2}{ON^2} \overline{NL} = dF$$

$$\frac{m}{r^2} dF = \frac{m}{r^2} \frac{OM^2}{ON^2} \overline{NL}$$

$$= \frac{m}{ON^2} \overline{NL}$$

$$NL = dF' \cos\varphi$$

$$\frac{m}{r^2} dF = \frac{m}{ON^2} dF' \cos\varphi$$

$$= \Phi \, dF'$$

$\cos\varphi$ [illegible] $\frac{m}{ON^2}$ [illegible] Norm. [illegible] $= \Phi$

$$\underbrace{\int \frac{m}{r^2} dF}_{4\pi m} = \int \Phi \, dF'$$

$$= \int \Phi \, dF'$$

[illegible] Norm. [illegible] mult. [illegible] $= 4\pi m$ [illegible]

[illegible]:

[illegible] m [illegible] ∞ [illegible] [[illegible]] [illegible]

[illegible] dF [illegible] dF [illegible]

[illegible]

$$4\pi \cdot m = \int \varphi \, dF'$$

$$4\pi m' = \int \varphi' \, dF'$$

$$4\pi(\underbrace{m + m' + \cdots}_{M}) = \int \underbrace{(\varphi + \varphi' + \cdots)}_{N} dF'$$

$N =$ [illegible] Norm.

$$4\pi M = \int N \, dF'$$

N [illegible]

$U =$ [illegible]

$-\frac{dU}{dn}$ $\qquad 4\pi M = -\int \frac{dU}{dn} \cdot dF'$

[illegible] Norm. [illegible]

[illegible] M ?

A, A', B', C', A, C, B

[illegible]

[illegible]

$$\frac{m}{OA^2}\overline{AC} = \frac{m}{OA'^2}\overline{A'C'}$$

$\Omega =$ Centrum [illegible]

$$\sum \frac{m}{OA^2}\overline{AC} = \sum \frac{m}{OA'^2}\overline{A'C'} = m\,\Omega.$$

$\overline{AC} = \overline{AB}\cos\varphi$

$\overline{A'C'} = \overline{A'B'}\cos\varphi'$ $\qquad \sum \frac{m}{OA^2} AB\cos\varphi = \sum \frac{m}{OA'^2}\cos\varphi . A'B'$

Norm. Comp. [illegible]

[illegible] : [illegible] $\times$ Fläche $=$ [illegible] : [illegible] $\times$ Fläche ;

[illegible] ; [illegible] $= 0$

[illegible] $= 0$?

[illegible] $AB\,A'B'$

$\varphi' : A'B'$

$-\varphi : AB$

$= 0$

[illegible] AA' [illegible] BB' [illegible]

$$\varphi : \varphi' = A'B' : AB$$

[illegible]

11/11 Der Green'sche Satz

[illegible] dV [illegible] $dx\,dy\,dz$

$$\iiint dx\,dy\,dz \,.\, S \,.\, \frac{d^2H}{dx^2}$$

[illegible]

$$= \iint dy\,dz \int S \frac{d^2H}{dx^2}\,dx$$

[illegible]

$$\int S \frac{d^2H}{dx^2}\,dx = S\frac{dH}{dx}\Big| - \int \frac{dS}{dx}\frac{dH}{dx}\,dx$$

[illegible] $$\iiint S\frac{d^2H}{dy^2}\,dx\,dy\,dz = \iint dx\,dz \int S\frac{d^2H}{dy^2}\,dy$$

[illegible]

$$\iiint S\left[\frac{d^2H}{dx^2}+\frac{d^2H}{dy^2}+\frac{d^2H}{dz^2}\right]dx\,dy\,dz =$$

$$= \iint\left(S\frac{dH}{dx}\right)dy\,dz + \iint\left(S\frac{dH}{dy}\right)dx\,dz + \iint\left(S\frac{dH}{dz}\right)dx\,dy$$

$$- \iiint\left[\frac{dS}{dx}\frac{dH}{dx}+\frac{dS}{dy}\frac{dH}{dy}+\frac{dS}{dz}\frac{dH}{dz}\right]dx\,dy\,dz$$

[illegible]

$$dy\,dz = dF\cos\lambda$$

$$\iint\left(\varrho \frac{dH}{dx}\right) dy\, dz \qquad \iint\left(\varrho \frac{dH}{dx}\right)_1 dF_1 \cos\lambda_1 \quad \text{[illegible]}$$

$$-\iint\left(\varrho \frac{dH}{dx}\right)_0 dF_0 \cos\lambda_0$$

$$dy\, dz_0 = dF_0 \cos\lambda_0$$

$$= \underbrace{\iint\left(\varrho \frac{dH}{dx}\right)_1 dF_1 \cos\lambda_1}_{\text{[illegible]}} + \underbrace{\iint\left(\varrho \frac{dH}{dx}\right)_0 dF_0 \cos\lambda'}_{\text{[illegible]}}$$

[illegible]

$$= \iint \varrho \frac{dH}{dx} dF \cos\lambda \quad \text{[illegible]}$$

[illegible]:

$$\iint\left(\varrho \frac{dH}{dx}\right) dy\, dz = \iint\left(\varrho \frac{dH}{dx}\right) \cos\lambda\, dF$$

$$\iint\left(\varrho \frac{dH}{dy}\right) dx\, dz = \iint\left(\varrho \frac{dH}{dy}\right) \cos\mu\, dF$$

$$\iint\left(\varrho \frac{dH}{dz}\right) dx\, dy = \iint\left(\varrho \frac{dH}{dz}\right) \cos\nu\, dF$$

$$\iiint(\varrho\, \Delta H)\, dx\, dy\, dz = \iint \varrho\left[\frac{dH}{dx}\cos\lambda + \frac{dH}{dy}\cos\mu + \frac{dH}{dz}\cos\nu\right] dF$$

$$-\iiint\left[\frac{d\varrho}{dx}\frac{dH}{dx} + \cdots\cdots\right] dx\, dy\, dz$$

$$\cos\lambda = \frac{dx}{dn} \qquad \cos\mu = \frac{dy}{dn} \qquad \cos\nu = \frac{dz}{dn}$$

$$\frac{dH}{dx}\cos\lambda + \cdots\cdots = \frac{dH}{dx}\frac{dx}{dn} + \cdots\cdots = \frac{dH}{dn}$$

$$\iiint \varrho\left(\frac{d^2H}{dx^2} + \frac{d^2H}{dy^2} + \frac{d^2H}{dz^2}\right) dx\, dy\, dz = \iint \varrho \frac{dH}{dn} dF - \iiint\left[\frac{d\varrho}{dx}\frac{dH}{dx} + \frac{d\varrho}{dy}\frac{dH}{dy} + \frac{d\varrho}{dz}\frac{dH}{dz}\right] dx\, dy\, dz$$

~ Int. [illegible]

zB. $g = 1$ $H = U$ = [illegible]

I). $M = \rho$

$$\frac{d^2U}{dx^2} + \frac{d^2U}{dy^2} + \frac{d^2U}{dz^2} = -4\pi\rho$$

$$-4\pi\iiint \rho\, dx\, dy\, dz = \iint \frac{dU}{dn}\, dF \qquad \frac{dg}{dx} \text{ etc} = 0$$

[illegible] M

$$+4\pi M = -\iint \frac{dU}{dn}\, dF$$ } [illegible]

[illegible] Normal[illegible] $= q$

$$= -\iint q\, dF$$

[illegible] ---

[illegible] $= 0$ ~

II $g = U$ $H = U$

$$-4\pi\iiint U\rho\, dx\, dy\, dz = \iint U\frac{dU}{dn}\, dF - \iiint\left[\left(\frac{dU}{dx}\right)^2 + \left(\frac{dU}{dy}\right)^2 + \left(\frac{dU}{dz}\right)^2\right] dx\, dy\, dz$$

zB. [illegible] -Niveaufl.

[illegible] U [illegible] const. [illegible]

$$-4\pi\iiint U\rho\, dx\, dy\, dz = U\iint \frac{dU}{dn}\, dF - \iiint[\ldots\ldots] \text{---}$$

[illegible] ~

[illegible] Niveaufl. [illegible] $= 0$ ~

$$0 = ~~U(-4\pi)~~ \underset{=0}{M} - \iiint\left[\left(\frac{dU}{dx}\right)^2 + \ldots\right] dx\, dy\, dz$$

[illegible] $[\;\;]^2$ [illegible]

$\frac{dU}{dx} = \frac{dU}{dy} = \frac{dU}{dz} = 0$; [illegible] const. [illegible]

-Niveaufl. [illegible] ~~const.~~ [illegible]

[illegible] Pot. [illegible] const. [illegible]
const. [illegible]

2 [illegible] I

~~$-4\pi\iiint \rho\, dx\, dy\, dz$~~

$$-4\pi M = \iint \frac{dU}{dn}\, dF$$

[illegible] $= U$ [illegible] const. [illegible]

[illegible]

$-4\pi M = 0$; [illegible] $= 0$

[illegible]

$=$ [illegible] [[illegible]].

12/11 [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] $\frac{dV}{dn} = 0$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Pot. [illegible] − const. [illegible]

[illegible]

[illegible] anal. Fct.

[illegible]

[illegible]

[illegible]

III [illegible]

$g = \frac{1}{r}$ [illegible]

$H = U$

$$-4\pi \iiint \frac{1}{r}\,\rho\,dx\,dy\,dz = \iint \frac{1}{r}\frac{dU}{dn}\,dF + \iiint \left(\frac{dU}{dx}\frac{d(\frac{1}{r})}{dx} + \ldots\right) dx\,dy\,dz$$

[illegible] $\times 4\pi$

[illegible] $\frac{\frac{dU}{dn}}{r}$ [illegible] Pot.

[illegible] $\frac{dU}{dn}$ [illegible]

A, a, b, c, M, r, r_2

$$\frac{d(\frac{1}{r})}{dx} = -\frac{1}{r^2}\frac{dr}{dx} \qquad r^2 = (x-a)^2 + (y-b)^2 + (z-c)^2$$

$$r\frac{dr}{dx} = x - a$$

$$\frac{dH}{dx}\left(-\frac{1}{r^2}\right)\frac{x-a}{r}$$

$$-4\pi \iiint \rho \frac{dx\,dy\,dz}{r} = \iint \frac{1}{r}\frac{dU}{dn}\,dF + \iiint \frac{1}{r^2}\left[\frac{dU}{dx}\frac{x-a}{r} + \frac{dU}{dy}\frac{y-b}{r} + \frac{dU}{dz}\frac{z-c}{r}\right] dx\,dy\,dz$$

$\frac{dU}{dx}$ ... [illegible] M

$\frac{x-a}{r} = \cos$ [illegible] AM [illegible] X [illegible]

[illegible] [ ] = [illegible]

$$= \iint \frac{1}{r} \frac{dU}{dn}\, dF + \iiint \frac{1}{r^2} \frac{dU}{dr}\, dx\, dy\, dz$$

[illegible] C. [illegible] O.C. [illegible]

[illegible] Vol. [illegible] ∞ [illegible] $\rho^2 \omega\, dr$ [illegible] Pyram.

$$\iiint \frac{1}{r^2} \frac{dU}{dr}\, dx\, dy\, dz = \iiint \frac{dU}{dr}\, \omega\, dr$$

[illegible] r [illegible] ω

$$= \iint \omega \int \frac{dU}{dr}\, dr$$

[illegible] U_1

[illegible] U_2

$$= \iint \omega (U_1 - U_2)$$

$$\iiint \frac{\rho\, dx\, dy\, dz}{r} = -\frac{1}{4\pi} \iint \frac{1}{r} \frac{dU}{dn}\, dF - \frac{1}{4\pi} \iint \omega (U_1 - U_2)$$

[illegible] Niveaufläche [illegible] Pot. U [illegible] $U_1 = U_2$

[illegible]

$$\iiint \frac{\rho\, dx\, dy\, dz}{r} = -\frac{1}{4\pi} \iint \frac{1}{r} \frac{dU}{dn}\, dF$$

[illegible] Pot. [illegible] A = [illegible] Pot.

[illegible] Niveaufläche [illegible] $\sigma = -\frac{1}{4\pi} \frac{dU}{dn}$

[illegible] N.F. [illegible] N.F. [illegible]

[illegible] aeq. [illegible] O.F. const. [illegible]

[illegible]

[illegible]

[illegible] $\frac{dU}{dn} = -\frac{m}{r^2}$

$\sigma = \frac{-m}{4\pi r^2}$

[illegible] N.F. [illegible]

? [illegible] A [illegible] ?

[illegible] A [illegible]

[illegible] r_1 — U_1 [illegible] $r=0$ [illegible]

$\therefore \int \frac{dU}{dr} = \int (U_1 - U_0) \frac{w}{\sqrt{2 U_1 A}}$

$$\iiint \frac{\rho \, dx\, dy\, dz}{r} = -\frac{1}{4\pi} \iint \frac{1}{r} \frac{dU}{dn} dF - \frac{1}{4\pi} \iint w (U_1 - U_0)$$

[illegible] int. [illegible]

[illegible] N.F. U_1 const. U_0 [illegible] const.

$\therefore$ [illegible] U_1, U_0 [illegible] $\iint w = 4\pi$

$$\iiint \frac{\rho \, dx\, dy\, dz}{r} = -\frac{1}{4\pi} \iint \frac{1}{r} \frac{dU}{dn} dF - (U_1 + U_0)$$

2μ: [illegible] N.F. [illegible]

I U_0 $\therefore$ Pot. [illegible] A $\int \frac{\rho\, dx\, dy\, dz}{r}$ [illegible] $= U_0$

$\therefore -\frac{1}{4\pi} \iint \frac{1}{r} \frac{dU}{dn} dF = U_1$

[illegible] aeq. [illegible] (2)

Pot. [illegible] U_1 = [illegible] Pot. [illegible] N.F. [illegible]

const.; [illegible] N.F. [illegible]

[illegible]

[illegible] ε, ε'

[illegible] N.F. const. $\frac{\varepsilon}{r} + \frac{\varepsilon'}{r'} = \text{const.}$; [illegible]

[illegible] $-\frac{1}{4\pi}\frac{dU}{dn}$ [illegible]

II [illegible] indirect [illegible]

$$\iiint \frac{\rho\, dx\, dy\, dz}{r} = \text{[illegible]}$$

$$= U'$$

[illegible] $= U''$

$U = U' + U''$ [illegible]

$U_1 = U_1' + U_1''$

$U_0 = U_0' + U_0''$

$$U_0' = -\frac{1}{4\pi}\iint \frac{1}{r}\frac{dU}{dn}\, dF - U_1 + U_0' + U_0''$$

$U_1 = \text{const.}$ [illegible] N.F.; [illegible] U_0' [illegible]

$$U_1 = -\frac{1}{4\pi}\iint \frac{1}{r}\frac{dU}{dn}\, dF + U_0''$$

[illegible] const. [illegible] U_1 [illegible]

[illegible] = const. [illegible]

13/11 [illegible]:

$\varrho' = -$

$\varrho = +$

[illegible] N.F. [illegible]

$$U = \frac{\varrho}{r} - \frac{\varrho'}{r'}$$ [illegible] $U = \text{const.}$ [illegible] N.F.

[illegible]

$U = 0 \qquad \frac{\varrho}{r} = \frac{\varrho'}{r'}$

$\varrho^2 r'^2 = \varrho'^2 r^2$ [illegible] x^2 [illegible] y^2 [illegible]

[illegible] Polarcoord. $\varepsilon^2(s^2+p'^2-2sp'\cos\theta) = \varepsilon'^2(s^2+p^2-2ps\cos\theta)$

[illegible] $p-p'$ [illegible]

[illegible] C.A. [illegible]:

$$\varepsilon^2 p' = \varepsilon'^2 p$$

$$\varepsilon^2(s^2+p'^2) = \varepsilon'^2(s^2+p^2)$$

[illegible] 0.

$$s^2(\varepsilon^2-\varepsilon'^2) = \varepsilon'^2 p^2 - \varepsilon^2 p'^2$$

$$s^2 = \frac{\varepsilon'^2 p^2 - \varepsilon^2 p'^2}{\varepsilon^2-\varepsilon'^2}$$

ε [illegible] $= \varepsilon'$ [illegible] $s = \infty$ [illegible] N.F. [illegible]

$$\varepsilon^2 p' = \varepsilon'^2 p$$

$$s^2 = \frac{\varepsilon^2 pp' - \varepsilon^2 p'^2}{\varepsilon^2 - \frac{\varepsilon^2 p'}{p}} = \frac{p'(p-p')}{1-\frac{p'}{p}} = pp'$$

$$a^2 = pp'$$

$$\varepsilon'^2 = \varepsilon^2 \frac{p'}{p} = \varepsilon^2 \frac{a^2}{p^2}$$

ε' ε ε

$$\varepsilon' = \varepsilon \frac{a}{p}$$

[illegible]

ε [illegible] $\varepsilon' = \varepsilon \frac{a}{p} = 0.$

[illegible]:

$$\sigma = -\frac{1}{4\pi}\frac{dU}{dn}$$

$$\frac{dU}{dn} = \frac{dU}{ds} = -\frac{\varepsilon}{r^2}\frac{dr}{ds} + \frac{\varepsilon'}{r'^2}\frac{dr'}{ds}$$

$$= -\frac{\varepsilon(s-p\cos\theta)}{r^3} + \frac{\varepsilon'(s-p'\cos\theta)}{r'^3}\Bigg|_{s=a}$$

$$= -\frac{\varepsilon(a-p\cos\theta)}{(a^2+p^2-2pa\cos\theta)^{\frac{3}{2}}} + \frac{\varepsilon'(a-p'\cos\theta)}{(a^2+p'^2-2ap'\cos\theta)^{\frac{3}{2}}}$$

$$= -\frac{\mathcal{E}(a-\rho\cos\theta)}{(\quad)^{\frac{3}{2}}} + \frac{\mathcal{E}a}{\rho}\frac{\left(a-\frac{a^2}{\rho}\cos\theta\right)}{\left(a^2+\frac{a^4}{\rho^2}+2\frac{a^3}{\rho}\cos\theta\right)^{\frac{3}{2}}}$$

$$\frac{dU}{dn} = -\frac{\mathcal{E}(a-\rho\cos\theta)}{(\quad)^{\frac{3}{2}}} + \frac{\mathcal{E}a\rho^2\left(a-\frac{a^2}{\rho}\cos\theta\right)}{a^3(\quad)^{\frac{3}{2}}}$$

$$= -\frac{\mathcal{E}(a^2-a\rho\cos\theta)}{a(\quad)^{\frac{3}{2}}} + \frac{\mathcal{E}(\rho^2-a\rho\cos\theta)}{a(\quad)^{\frac{3}{2}}} =$$

$$= \frac{\mathcal{E}(\rho^2-a^2)}{a(a^2+\rho^2+2a\rho\cos\theta)^{\frac{3}{2}}}$$

$\sigma = -\frac{1}{4\pi}\frac{dU}{dn}$ [illegible]

[illegible] Res. [illegible] e^3 Pot. [illegible] R.

[illegible]:

[illegible]

P
x
y

r_2, r_1, B', O, A A', B, c

$OA = \alpha$

$AA' = d\alpha$

$\mu\, d\alpha =$ [illegible] AA' [illegible] Pot. $\frac{\mu\, d\alpha}{r}$

$$U = \int_{-c}^{+c} \frac{\mu\, d\alpha}{r} \qquad r^2 = (x-\alpha)^2 + y^2$$

$$U = \int_{-c}^{+c} \frac{\mu\, d\alpha}{\sqrt{(x-\alpha)^2+y^2}} = \mu\left.\left[-l\left\{\sqrt{(x-\alpha)^2+y^2}+(x-\alpha)\right\}\right]\right|_{-c}^{+c} =$$

$$= -\mu\, l\big(\underbrace{\sqrt{(x-c)^2+y^2}}_{r_1}+x-c\big) + \mu\, l\big(\underbrace{\sqrt{(x+c)^2+y^2}}_{r_2}+x+c\big)$$

$$U = \mu \, l \left(\frac{r_2 + x + c}{r_1 + x - c} \right)$$

$$r_1^2 = (x-c)^2 + y^2$$
$$r_2^2 = (x+c)^2 + y^2$$
$$r_2^2 - r_1^2 = 4cx$$

$$U = \mu \, l \left\{ \frac{r_2 + \frac{r_2^2 - r_1^2}{4c} + c}{r_1 + \frac{r_2^2 - r_1^2}{4c} - c} \right\}$$ [illegible] bipolaren Coord.

$$= \mu \, l \left\{ \frac{4cr_2 + r_2^2 - r_1^2 + 4c^2}{4cr_1 + r_2^2 - r_1^2 - 4c^2} \right\}$$

$$= \mu \, l \, \frac{(r_2 + 2c)^2 - r_1^2}{-(r_1 - 2c)^2 + r_2^2} = \mu \, l \, \frac{(r_1 + r_2 + 2c)(r_2 + 2c - r_1)}{(r_2 + r_1 - 2c)(r_2 - r_1 + 2c)} =$$

$$U = \mu \, l \, \frac{r_1 + r_2 + 2c}{r_1 + r_2 - 2c}$$ N.F.? $U = \text{const.}$

$\therefore (r_1 + r_2) = \text{Const.} =$ Ellopse [illegible] B, B'; [illegible] Rot. Ell.

$r_1 + r_2$ [illegible] $> 2c$ [illegible] l — [illegible]

[illegible]:

[illegible] const. Pot. ; [illegible] ; [illegible] R.E.

17/11

[illegible]:

$$U = \mu \, l \, \frac{r_1 + r_2 + 2c}{r_1 + r_2 - 2c}$$

$$\sigma = -\frac{1}{4\pi} \frac{dU}{dn}$$ $r_1 + r_2 = \text{const}$

$$\frac{dU}{dn} = \mu \left[\frac{1}{r_1 + r_2 + 2c} \left(\frac{dr_1}{dn} + \frac{dr_2}{dn} \right) - \frac{1}{r_1 + r_2 - 2c} \left(\frac{dr_1}{dn} + \frac{dr_2}{dn} \right) \right]$$

(Figure: triangle with sides r_2, r_1, point M, origin 0, segment c; ellipse with foci A, B, point M, M', P, radii r_1, r_2, normal N)

N, N' = Normale

$r_1 + r_2 = 2a$

[illegible] N. [illegible]:

[illegible] N. [illegible] N'; [illegible] B [illegible] RV

[illegible] r_2' ; $\frac{dr_2}{dn} = \frac{[illegible]\ RV}{[illegible]\ N.} = \frac{BM' - BM}{MM'}$

$$= \frac{PM'}{MM'} = \frac{MM' \cos\varphi}{MM'} = \cos\varphi$$

limes $\cos\varphi'' = \cos\varphi$

$\frac{dr_2}{dn} = \cos\varphi$ [illegible] $\frac{dx}{dn} = \cos X$ [illegible] N. [illegible]

$\frac{dr_1}{dn}$ = [illegible] Ellipse = ——

$$\frac{dr_1}{dn} = \cos\varphi$$

$$\frac{dU}{dn} = \mu\left[\frac{1}{2a+2c} - \frac{1}{2a-2c}\right]2\cos\varphi = -\frac{8\mu c\cos\varphi}{4a^2-4c^2} =$$

$$= -\frac{2\mu c\cos\varphi}{b^2} \qquad \sigma = \frac{\mu c\cos\varphi}{2\pi b^2}$$

[illegible] $\cos$ [illegible] N [illegible]

p_2 r_2 p φ r_1 p_1 B A

$$p_1 = r_1\cos\varphi$$

$$p_2 = r_2\cos\varphi$$

$$p_2 + p_1 = 2a\cos\varphi$$

$$p = \frac{p_1+p_2}{2} = a\cos\varphi$$

$$\frac{dU}{dn} = -\frac{2\mu c p}{a b^2} \qquad \sigma = \frac{1}{4\pi}\frac{2\mu c p}{a b^2}$$

[illegible] $2\mu c = \mathcal{E}$

Vol. [illegible] Ell. $= K = \frac{4}{3}ab^2\pi$

$$\sigma = \frac{\mathcal{E}p}{4\pi ab^2} = \frac{\mathcal{E}p}{3K}$$ [illegible] [illegible]

[illegible] Ell. [illegible]

[illegible]

Ell. [illegible]

[illegible]

$$U = \frac{\overset{\mathcal{E}}{2c\mu}}{2c}\, l\frac{2a+2c}{2a-2c} = \frac{\mathcal{E}}{2c}\, l\frac{a+c}{a-c} = \frac{\mathcal{E}}{c}\, l\frac{a+c}{b} = \mathcal{E}Z$$

$= P$

[illegible] Vol. U [illegible] Vol. [illegible] Ell. [illegible]

[illegible] Ell. [illegible]

[illegible] $\mathcal{E} = \frac{P}{2}$

Capacität [illegible] Ell. $= \frac{1}{Z} = \frac{c}{l\,\frac{a+c}{b}}$

[illegible] Ell. [illegible] $= 2a$, b [illegible] ; [illegible]

[illegible] l : Capac. [illegible] $= \frac{\frac{l}{2}}{l\,\frac{l}{b}} = \frac{l}{2\,l\,\frac{l}{b}}$; [illegible]

Z, m, a, φ, $\frac{\xi}{\eta}$, y

[illegible] X Pot. [illegible]

[illegible]

[illegible] $a\,d\varphi\,\mu$ [illegible]

$$U = \int \frac{a\,d\varphi\,\mu}{(mM)}$$

$$(mM)^2 = (a+\xi - a\cos\varphi)^2 + \eta^2 + a^2\sin^2\varphi$$

$$= (a+\xi)^2 - 2a(a+\xi)\cos\varphi + a^2 + \eta^2$$

$$\xi^2 + \eta^2 = \rho^2 \qquad = a^2 + 2a\xi + \xi^2 - 2a(a+\xi)\cos\varphi + a^2 + \eta^2$$

[illegible] $(mM)^2 = 2a(a+\xi)(1-\cos\varphi) + \rho^2$

[illegible] $0 - 2\pi$ [illegible]

$$U = 2\int_0^{\pi} \frac{a\,d\varphi\,\mu}{\sqrt{\rho^2 + 4a(a+\xi)\sin^2\frac{\varphi}{2}}} = \frac{a\,\mu}{\sqrt{a(a+\xi)}} \int_0^{\pi} \frac{d\varphi}{\sqrt{\frac{\rho^2}{4a(a+\xi)} + \sin^2\frac{\varphi}{2}}}$$

$$\frac{\varphi}{2} = \psi \qquad = \frac{2a\mu}{\sqrt{a(a+\xi)}} \int_0^{\frac{\pi}{2}} \frac{d\psi}{\sqrt{p^2 + \sin^2\psi}} \qquad p^2 = \frac{\rho^2}{4a(a+\xi)}$$

[illegible] $\int$ [illegible] p^2 [illegible] $\sin\psi$ [illegible] ; ψ_1 [illegible] ψ [illegible] $\sin\psi$ [illegible]

$$\int_0^{\frac{\pi}{2}} \frac{d\psi}{\sqrt{p^2 + \sin^2\psi}} = \int_0^{\psi_1} + \int_{\psi_1}^{\frac{\pi}{2}} = \int_0^{\psi_1} \frac{d\psi}{\sqrt{p^2+\psi^2}} + \int_{\psi_1}^{\frac{\pi}{2}} \frac{d\psi}{\sin\psi} =$$

$$= l\left(\psi + \sqrt{p^2+\psi^2}\right)\Big|_0^{\psi_1} + l \operatorname{tg} \frac{\psi}{2}\Big|_{\psi_1}^{\frac{\pi}{2}}$$

18/11 $$\int_0^{\frac{\pi}{2}} \frac{d\psi}{\sqrt{p^2+\sin^2\psi}} = \int_0^{\psi_1} + \int_{\psi_1}^{\frac{\pi}{2}}$$

$$= l\left(\psi+\sqrt{p^2+\psi^2}\right)\Big|_0^{\psi_1} + l \operatorname{tg} \frac{\psi}{2}\Big|_{\psi_1}^{\frac{\pi}{2}}$$

$$= l\left(\psi_1 + \sqrt{p^2+\psi_1^2}\right) - l p + 0 - l \operatorname{tg}\frac{\psi_1}{2}$$

[illegible] p^2

$$= l(2\psi_1) - l p - l \frac{\psi_1}{2}$$

$$= l \frac{4}{p}$$ [illegible]

$$U = \frac{2\mu a}{\sqrt{a(a+\xi)}}\, l \frac{4}{p} \qquad p^2 = \frac{\rho^2}{4a(a+\xi)}$$

ξ [illegible]

$$U = 2\mu\, l \frac{8a}{\rho}$$

$U = \text{const.}\ \mu\ l$ [illegible]

[illegible] Niveaufläche [illegible]

[illegible]

[illegible]

$$\frac{dU}{dn} = -\frac{2\mu}{\rho} \ ?$$

$$P = 2\mu\, l \frac{8a}{\rho} \qquad e = 2\pi a \mu$$ [illegible]

$$= \frac{e}{\pi a}\, l \frac{8a}{\rho} \qquad e = \frac{\pi a}{l \frac{8a}{\rho}}\, P \qquad C = \frac{\pi a}{l \frac{8a}{\rho}} = \text{Capacität}$$ [illegible]

zB: [illegible] $\angle a = 10$ $\varrho = 0{\cdot}1$ [$h = 2$ mm]

$\frac{8a}{\varrho} = 800 = 2{\cdot}903$

$3{\cdot}2$

5806

871

$= 6{\cdot}677$

$C = \frac{3{\cdot}14}{6{\cdot}68} \cdot 10 < \frac{a}{2}$

[illegible] Cap. [illegible] $= a$

[illegible] Cap. [illegible]

$\frac{1}{2}$ [illegible]

[illegible] Cap.

Ellipsoid

$C' = \frac{c}{l\frac{a+c}{a-c}}$ [illegible] Rot. Ell.

$a+c$ [illegible] $= 2a =$ [illegible]

$b =$ Rad.

$= 2$

$C' = \frac{\frac{l}{2}}{l\frac{l}{\varrho}}$ [illegible]

$C = \frac{\pi a}{l\frac{8a}{\varrho}}$ [illegible] Cap. [illegible]

[illegible] Ell. [illegible]

[[illegible] Ell. [illegible]]!

[illegible] N.F. [illegible] Ell. [illegible]

---

r_2 ds ds' λ r ω

Ell. [illegible]

$\frac{\sigma\, ds}{r^2}$ [illegible]

$\frac{\sigma\, ds'}{r'^2}$ [illegible]

[illegible] $= \omega$

$r^2\omega = ds \cos\lambda$

$r'^2\omega = ds' \cos\lambda'$ [illegible] $\lambda = \lambda'$

$= ds' \cos\lambda$

$\frac{\sigma\, ds}{r^2} = \frac{\sigma r^2 \omega}{r^2 \cos\lambda}$

[illegible] $ds\, ds'$

$\frac{\sigma\, ds'}{r'^2} = \frac{\sigma r'^2 \omega}{r'^2 \cos\lambda}$

[illegible] 3 [illegible] Ellips.

$x\,y\,z$ $\quad \frac{\sigma\,ds}{r^2} = K; \quad \frac{\sigma' ds'}{r'^2} = K'$

$\sigma' ds'$ $x'y'z'$

$r^2 \omega = ds \cos\lambda$ $\qquad$ λ [illegible] λ' [illegible]

$r'^2 \omega = ds' \cos\lambda'$

$K = \frac{\sigma r^2 \omega}{r^2 \cos\lambda} \qquad K' = \frac{\sigma' \omega}{\cos\lambda'}$ $\qquad$ [illegible] $\sigma : \sigma' = \cos\lambda : \cos\lambda'$

[illegible] K [illegible] K' [illegible]

[illegible] Ellips. [illegible]

29/11 $\quad$ σ $x\,y\,z$ $\quad$ r $a\,b\,c$ $\quad$ σ' $x'y'z'$ $\quad$ [illegible]

$\sigma : \sigma' = \cos\lambda : \cos\lambda'$

[illegible] Tang. [illegible]

$F(x\,y\,z) =$ [illegible]

$$\cos\lambda = \frac{\frac{\partial F}{\partial x}}{\sqrt{\left(\frac{\partial F}{\partial x}\right)^2 + \left(\frac{\partial F}{\partial y}\right)^2 + \left(\frac{\partial F}{\partial z}\right)^2}} \qquad \cos\mu = \qquad \cos\nu =$$

$$\cos\alpha = \frac{x-a}{\sqrt{(x-a)^2 + \cdots}}$$

$$\cos\alpha = \frac{x-x'}{\sqrt{(x-x')^2 + (y-y')^2 + (z-z')^2}} \qquad \cos\beta = \qquad \cos\gamma =$$

$$\cos\varphi = \cos\alpha\cos\lambda + \cos\beta\cos\mu + \cos\gamma\cos\nu$$

$$F = \frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

$$\frac{\partial F}{\partial x} = \frac{2x}{a^2} \qquad \frac{\partial F}{\partial z} = \frac{2z}{c^2}$$

$$\frac{\partial F}{\partial y} = \frac{2y}{b^2}$$

$$\cos\lambda = \frac{2x}{a^2}\frac{1}{\sqrt{\frac{4x^2}{a^4}+\cdots}} = \frac{x}{a^2}\frac{1}{\sqrt{\frac{x^2}{a^4}+\frac{y^2}{b^4}+\frac{z^2}{c^4}}} \quad \Big\} = \mu$$

$$\cos\lambda = \frac{\mu x}{a^2} \qquad \cos\mu = \frac{\mu y}{b^2} \qquad \cos\nu = \frac{\mu z}{c^2}$$

$p = \xi\cos\lambda + \eta\cos\mu + \zeta\cos\nu$ [illegible shorthand] $N \perp 6$

$$= \mu\left[\frac{\xi x}{a^2} + \frac{\eta y}{b^2} + \frac{\zeta z}{c^2}\right]$$

[illegible shorthand]

$$6_0 P = \mu\left[\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}\right] = \mu$$

$$\cos\varphi = \mu\left[\frac{\frac{(x-x')x}{a^2}+\cdots}{\sqrt{(x-x')^2+\cdots}}\right] =$$

$$= \frac{\mu\left[1 - \frac{xx'}{a^2} - \frac{yy'}{b^2} - \frac{zz'}{c^2}\right]}{\sqrt{}}$$

$\int 6$:

$$\cos\varphi' = \cos\alpha'\cos\lambda' + \cos\beta'\cos\mu' + \cos\gamma'\cos\nu'$$

$$= \frac{x'-x}{\sqrt{}}\frac{\mu' x'}{a^2} + \cdots$$

$$= \frac{\mu'\left[1 - \frac{xx'}{a^2} - \frac{yy'}{b^2} - \frac{zz'}{c^2}\right]}{\sqrt{}}$$

$\cos\varphi : \cos\varphi' = \mu : \mu' = 6 : 6'$ [illegible shorthand]

[illegible shorthand] Hyperboloid. [illegible shorthand]

$\sigma = \alpha p$ [illegible] ; [illegible] $= \mathcal{E}$

$\mathcal{E} = \int \sigma \, ds = \alpha \int p \, ds$

$= \alpha . 3 . k$

$p \, ds = 3 \times$ [illegible] Pyr. [illegible]

$\int \cdots =$ [illegible] $\mathcal{E}$.

$\alpha = \frac{\mathcal{E}}{3k}$

$\sigma = \frac{\mathcal{E} p}{3k}$

<u>Capacität [illegible] Ellipsoides:</u>

[illegible]

[illegible]

$\int \frac{ds \cdot \sigma}{r} = \frac{\mathcal{E}}{3k} \int \frac{p \, ds}{r}$ [illegible]

[illegible] $\times$

$= r^3 \omega$

$\int \frac{p \, ds}{r} = \int \frac{r^3 \omega}{r} = \int r^2 \omega$

$\omega = \sin\theta \, d\theta \, d\varphi$

$x = r \cos\theta$

$y = r \sin\theta \cos\varphi$

$z = r \sin\theta \sin\varphi$

$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

$r^2 \left[\frac{\cos^2\theta}{a^2} + \frac{\sin^2\theta \cos^2\varphi}{b^2} + \frac{\sin^2\theta \sin^2\varphi}{c^2} \right] = 1$

$\int \frac{p \, ds}{r} = \iint \frac{\sin\theta \, d\varphi \, d\theta}{\frac{\cos^2\theta}{a^2} + \frac{\sin^2\theta \cos^2\varphi}{b^2} + \frac{\sin^2\theta \sin^2\varphi}{c^2}}$

[illegible] Rot. Ell. $b=c$

$$\int \frac{\rho\, ds}{r} = 2\pi \int_0^{\pi} \frac{\sin\theta\, d\theta}{\frac{\cos^2\theta}{a^2}+\frac{\sin^2\theta}{b^2}}$$

$$= 4\pi \int_0^{\frac{\pi}{2}} \frac{\sin\theta\, d\theta}{\dots} = 4\pi \int_0^{\frac{\pi}{2}} \frac{\sin\theta\, d\theta}{\frac{1}{b^2}+\left(\frac{1}{a^2}-\frac{1}{b^2}\right)\cos^2\theta}$$

[illegible] $(\quad) +$ [illegible] $-\mathrm{arctg}.$

$$= -4\pi \int_1^0 \frac{du}{\frac{1}{b^2}+\left(\frac{1}{a^2}-\frac{1}{b^2}\right)u^2} = 4\pi b^2 \int_0^1 \frac{du}{1+\left(\frac{b^2}{a^2}-1\right)u^2} =$$

$$= \frac{4\pi b^2}{\sqrt{\frac{b^2}{a^2}-1}} \int \mathrm{arctg}\left[u\sqrt{\frac{b^2}{a^2}-1}\right]\Bigg|_0^1 =$$

$$= \frac{4\pi b^2}{\sqrt{\frac{b^2}{a^2}-1}}\, \mathrm{arctg}\sqrt{\frac{b^2}{a^2}-1}$$

$$U = \frac{e}{3k}\,\frac{4\pi b^2}{\sqrt{\frac{b^2}{a^2}-1}}\, \mathrm{arctg}\sqrt{\frac{b^2}{a^2}-1} = \frac{e}{\sqrt{b^2-a^2}}\, \mathrm{arctg}\sqrt{\frac{b^2}{a^2}-1}$$

$$E = CU$$

$$C = \frac{\sqrt{b^2-a^2}}{\mathrm{arctg}\sqrt{\frac{b^2}{a^2}-1}}$$

| $b=a$ [illegible]

$$C = \frac{a\sqrt{\frac{b^2}{a^2}-1}}{\mathrm{arctg}\sqrt{}} = a$$

[illegible]

$$C = \frac{b}{\frac{\pi}{2}} = \frac{2b}{\pi}$$ [illegible] $\frac{2}{3}$ [illegible]

24/11 E. Vertheilung auf einer Ellipsen-Scheibe.

Z

ds

σ

ds'

X

Y

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

[illegible]:

$\sigma' =$ [illegible]

$$\sigma' : \sigma = ds : ds'$$

$$ds' = ds \cos\lambda$$

$$= ds \frac{px}{a^2} \qquad p = \text{[illegible]}$$

$$\sigma' = \frac{\sigma\, ds}{ds'} = \frac{\sigma}{\cos\lambda} = \frac{\sigma a^2}{px}$$

$$\sigma = \frac{E p}{4\pi abc} \qquad \sigma' = \frac{E p a^2}{4\pi abc\, px} = \frac{E}{4 bc\pi} \frac{a}{x} = \frac{E}{4 bc\pi} \frac{1}{\frac{x}{a}}$$

$$= \frac{E}{4\pi bc} \frac{1}{\sqrt{1 - \frac{y^2}{b^2} - \frac{z^2}{c^2}}} = \text{[illegible]}$$

[illegible]

$$\sigma_1 = \frac{E}{2\pi bc} \frac{1}{\sqrt{}} \quad \Big| \quad \text{[illegible]} \; b = c \; \sigma^2$$

$$\sigma_1 = \frac{E}{2\pi b^2 \sqrt{1 - \frac{(y^2+z^2)}{b^2}}} =$$

[illegible]

$(y^2 + z^2) = b^2$

[illegible] $\sigma = \infty$

[illegible]:

ds

ds'

[illegible]

[illegible]

[illegible]

E.-Vertheilung auf einer Kreisscheibe.

m', m, r, r, r_1, m_1, m_1'

$$\frac{m}{r^2} = \frac{m_1}{r_1^2} \quad [illegible]$$

$$r' = \alpha\, r$$

$$r_1' = \alpha\, r_1$$

$$\frac{m}{r'^2} = \frac{m_1}{r_1'^2}$$

$$\frac{m}{\alpha^2 r^2} = \frac{m_1}{\alpha^2 r_1^2}$$

[illegible]

[illegible]

E., r, R, θ

[illegible]

σ

$\sigma\, ds$

[illegible]

$$2\sigma\, ds = \sigma_1\, ds_1$$

$ds_1 = ds \cos\theta$

$$2\sigma\, ds = \sigma_1\, ds \cos\theta$$

$$\sigma_1 = \frac{2\sigma}{\cos\theta}$$

$$= \frac{2\sigma}{\sqrt{1 - \frac{r^2}{b^2}}} = \frac{E}{2\pi b^2 \sqrt{1 - \frac{r^2}{b^2}}}$$

Capacität: [illegible]

$$U = \int_0^{\pi} \frac{2\pi\sigma \sin\theta\, d\theta\, b^2}{b \sin\theta} = 2b\pi\sigma\pi$$

$$U = \frac{2\pi b \pi E}{4\pi b^2} = \frac{\pi E}{2b}$$

$$E = \frac{2b}{\pi} U$$

$$\frac{2b}{\pi} = \text{Capacität}$$

[illegible] Ellipsoid

[illegible] Ellipsen-[illegible].

[illegible]

$x^2+y^2+z^2=h^2$ [illegible] Coord. [illegible]

$\xi = \frac{a x}{h}$ $\eta = y$ $\zeta = z$

$x = \frac{h \xi}{a}$

$\frac{h^2 \xi^2}{a^2} + \eta^2 + \zeta^2 = h^2$

$\frac{\xi^2}{a^2} + \frac{\eta^2 + \zeta^2}{h^2} = 1$ Rot. Ell.

<u>E.-Vertheilung auf einem Ellipsoid</u>

$\xi = \frac{a x}{h}$ $\eta = \frac{b y}{h}$ $\zeta = \frac{c z}{h}$

$\frac{\xi^2}{a^2} + \frac{\eta^2}{b^2} + \frac{\zeta^2}{c^2} = 1$ 3-[illegible] Ell.

[illegible] Ell. [illegible]

m, M, m_1, m', M', m'_1

[illegible] m [illegible] m_1, [illegible] M [illegible] m', [illegible] m' [illegible] M' [illegible].

[illegible]

[illegible]

ds', ds, h

$\sigma ds = \sigma' ds'$ [illegible] prop.

$dy\, dz = ds \frac{x}{h}$

$dy\, d\zeta = ds' \, p \frac{\xi}{a^2}$

$d\eta = \frac{b\,dy}{h}$ $d\zeta = \frac{c\,dz}{h}$

$\frac{bc}{h^2} \cdot dy\,dz = d\eta\,d\zeta = ds' \frac{p\,\xi}{a^2}$

$ds' = \frac{a^2 bc}{p h^2 \xi}\, dy\,dz$

$ds = \frac{h\,dy\,dz}{x}$

$\frac{\sigma h\,dy\,dz}{x} = \frac{\sigma' a^2 bc}{p h^2 \xi}\, dy\,dz$ $\xi = \frac{ax}{h}$

$= \frac{\sigma' a bc}{p h x}\, dy\,dz$

$\sigma h = \frac{\sigma' abc}{hp}$

$\sigma' = \sigma \frac{h^2 p}{abc} = \frac{E p}{4\pi abc}$

[illegible]. Vol. Ods : Vol Ods' = $h^3 : abc$ = $h\,ds : p\,ds'$

$\sigma' = \sigma \frac{ds}{ds'} = \sigma \frac{h^2 p}{abc}$

$= \frac{E p}{4\pi abc}$!!!

25/11

[illegible]

$\int_{\varphi_0}^{\varphi_1} 2\pi a \sin\varphi \, a\, d\varphi = -2\pi a^2 \cos\varphi \Big|_{\varphi_0}^{\varphi_1} =$

$= 2\pi a^2 (\cos\varphi_0 - \cos\varphi_1)$ [illegible] =

$= 2\pi a \, BC$ [illegible] Ell.

[illegible] Ell. [illegible]

[illegible] Ell.

[illegible] Ell. [illegible]

[illegible] Ell. dx .... $\frac{\varepsilon\, dx}{2a}$

[illegible]

[illegible] Ell. [illegible]; a, .. $a+\varepsilon$

$\xi^2 = 2x$ $x^2+y^2+z^2=a^2$

$x^2+y^2+z^2=(a+\varepsilon)^2$

$\xi = \alpha x \qquad \frac{\xi^2}{\alpha^2} + \frac{\eta^2}{\beta^2} + \frac{\zeta^2}{\gamma^2} = h^2$

$\eta = \beta y$

$\zeta = \gamma z \qquad \frac{\xi^2}{\alpha^2} + \quad \text{———} \quad = (h+\varepsilon)^2$

[illegible] Ell. [illegible]

$a\,b\,c \qquad a'\,b'\,c'$

$a = h\alpha \qquad a' = (h+\varepsilon)\alpha$

$b = h\beta \qquad b' = (h+\varepsilon)\beta$

$c = h\gamma \qquad c' = (h+\varepsilon)\gamma$

$a' : a = b' : b = c' : c = h+\varepsilon : h$ homothetische Ell.

[illegible] 2 homoth. Ell. [illegible]

[illegible] Ell. [illegible] Ell. [illegible] homoth. [illegible]

[illegible] [[illegible] Gravit.]

Methode der Inversion [illegible] rec. R.V.

[illegible] elast. [illegible]

[illegible]

r; $x\,y\,z$; h; r'; $x'\,y'\,z'$; x

[illegible]

$r\,r' = h^2 \qquad$ [illegible] inversion

[el. [illegible]]

[illegible] Constr. [illegible]

[illegible]

$\frac{x}{r} = \frac{x'}{r'} \qquad \frac{y}{r} = \frac{y'}{r'} \qquad \frac{z}{r} = \frac{z'}{r'}$

$x' = \frac{x r'}{r} = \frac{x r' r}{r^2} = \frac{h^2 x}{r^2} \qquad x = \frac{r x'}{r'} = \frac{r r' x'}{r'^2} = \frac{h^2 x'}{r'^2}$

[illegible]

$x = \alpha \qquad x' = \frac{h^2 x'}{r'^2} = \frac{h^2 \alpha}{r^2}$

$r'^2 \; x'^2 + y'^2 + z'^2 - \frac{h^2 \alpha}{x'} = 0$

$\pm \frac{h^4}{4\alpha^2}$

$\left(x' - \frac{h^2}{2\alpha}\right)^2 + y'^2 + z'^2 = \frac{h^4}{4\alpha^2}$ } [illegible] $x = \frac{h^2}{2\alpha}$

[illegible]

[illegible]

[illegible]

$(x-\alpha)^2 + y^2 + z^2 = \beta^2$

h

$h^4\left(\frac{x'}{r'^2}\right)^2 - 2\alpha h^2 \left(\frac{x'}{r'^2}\right) + \alpha^2 \left(+ \frac{h^2 y'}{r'^2} + \frac{h^2 z'}{r'^2} \right) = \beta^2$ [illegible]

[illegible]

r, δ, r', s, N, N'

[illegible]

$\delta^2 = r^2 + s^2 - 2rs\cos\theta$

$\delta'^2 = r'^2 + s'^2 - 2r's'\cos\theta$

$r' = \frac{h^2}{r}$

$= \frac{h^4}{r^2} + \frac{h^4}{s^2} - 2\frac{h^4}{rs}\cos\theta$

$= \frac{h^4}{r^2 s^2}\left[s^2 + r^2 - 2rs\cos\theta\right]$

$\delta' = \frac{h^2 \delta}{rs}$

$= \frac{h^4}{r^2 s^2}\delta^2$

[illegible] N [illegible] $U = \frac{e}{\delta}$

e [illegible] e' [illegible] e' [illegible] $= e'$

[illegible] inv. [illegible] $U' = \frac{e'}{\delta'}$

$$= \frac{e' r s}{h^2 \delta} = \frac{e' r s s'}{h^2 s' \delta} = \frac{e' r}{s' \delta}$$

[illegible] $e' r = e h$

$e' = \frac{h e}{r}$ $\quad U' = \frac{h e}{s' \delta} = \frac{h}{s'} U$ [illegible]

r U [illegible] s'

$U = \text{const.}$

[illegible] inv. [illegible] N [illegible] Pot. $\frac{hU}{s'}$

[illegible] $\frac{H}{s'}$

[illegible]

[illegible] N

= [illegible] infl. [illegible]

[illegible] William Thomson

26/11 [illegible] Reth. [illegible]

[illegible]:

$x' = \frac{x r'}{r} = \frac{h^2 x}{r^2}$

$dx' = \frac{h^2}{r^2} dx - \frac{2h^2 x}{r^3} dr \qquad dy' = \frac{h^2}{r^2} dy - \frac{2h^2 y}{r^3} dr$

$dz' = \frac{h^2}{r^2} dz - \frac{2h^2 z}{r^3} dr$

$dx'^2 + dy'^2 + dz'^2 = ds'^2 = \frac{h^4}{r^4} ds^2 - \frac{4h^4}{r^5} (x dx + y dy + z dz) dr$

$+ \frac{4h^4}{r^6} (x^2 + y^2 + z^2) dr^2$

I). $ds' = \frac{h^2}{r^2} ds$ [illegible shorthand]

[illegible shorthand]

[illegible shorthand]

$$\frac{dx'}{ds'} = \frac{h^2}{r^2}\frac{dx}{ds'} - \frac{2h^2x}{r^3}\frac{dr}{ds'}$$

$$= \frac{h^2}{r^2}\frac{dx}{\frac{h^2 ds}{r^2}} - \frac{2h^2x}{r^3}\frac{dr}{\frac{h^2 ds}{r^2}} = \frac{dx}{ds} - \frac{2x}{r}\frac{dr}{ds}$$

$\frac{dx}{ds} = \cos\measuredangle$ [illegible shorthand] ds [illegible] X [illegible]

$\frac{dr}{ds}$ ——— RN ——

} $\frac{dx'}{ds'} = \cos\measuredangle$ [illegible] ds' [illegible] X [illegible]

$$\cos\alpha' = \cos\alpha - \frac{2x}{r}\cos\varphi$$

$$\cos\alpha_1' = \cos\alpha_1 - \frac{2x}{r}\cos\varphi_1$$

[illegible shorthand] $\measuredangle\, \alpha_1^x\, \beta_1^x\, \gamma_1^x$ [illegible]

$$\cos\alpha'\cos\alpha_1' = \cos\alpha\cos\alpha_1 - \frac{2x}{r}(\cos\alpha\cos\varphi_1 + \cos\alpha_1\cos\varphi) + \frac{4x^2}{r^2}\cos\varphi\cos\varphi_1$$

$$\cos\beta'\cos\beta_1' = \cos\beta\cos\beta_1 - \frac{2y}{r}(\cos\beta\cos\varphi_1 + \cos\beta_1\cos\varphi) + \frac{4y^2}{r^2}\cos\varphi\cos\varphi_1$$

$\cos\gamma'\cos\gamma_1' =$ ——————————————

$\cos\theta' = \cos\theta -$ [illegible shorthand]

$$\cos\varphi = \frac{x}{r}\cos\alpha + \frac{y}{r}\cos\beta + \frac{z}{r}\cos\gamma$$
$$\cos\varphi_1 = \frac{x}{r}\cos\alpha_1 + \frac{y}{r}\cos\beta_1 + \frac{z}{r}\cos\gamma_1$$

[illegible shorthand] $\measuredangle\,\theta$ [illegible shorthand]

[illegible shorthand] inv. [illegible shorthand] $\measuredangle$ [illegible]

[illegible shorthand] Δ [illegible shorthand] $\measuredangle\,\theta$ [illegible shorthand]

[illegible shorthand] inv. [illegible shorthand]

[illegible shorthand] Inv. [illegible shorthand] inv. [illegible shorthand]

[illegible shorthand] Inv. [illegible shorthand]

[illegible shorthand] $\theta = 0$ [illegible shorthand] inf. [illegible] [illegible]

Will. Thomson [illegible]:

[illegible]

[illegible] etc. [illegible]

[illegible] Integr. [illegible] Rot. [illegible]

[illegible] anstr. [illegible]

[illegible]

[illegible]

a

c

b

[illegible] indukt. [illegible] induciert [illegible]

[illegible] u.s.w.

[illegible] Poisson [illegible] Kirchhoff.

[illegible]

[illegible] Murphy [illegible]

[illegible]

$\frac{E}{a} = \varphi$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible] E_1 [ve]. [illegible] E_2

[illegible] $= 0$ [illegible]

[illegible] E_2 [illegible] [ve]

[illegible]

[illegible] $E + E_2 + E_4 + \cdots$

[illegible] $E_1 + E_3 + \cdots$

[illegible]

[illegible]

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E [illegible] A [illegible] $\frac{E}{a}$ [illegible] A.

$E_1 =$ neg. [illegible] B

$E_1 = -\frac{E b}{\overline{AB}}$ [illegible]

A, A, A₂, B labels on diagram: a, A, A_2, A_1, B

$\overline{A_1 B} \cdot \overline{AB} = b^2$ [illegible] A [illegible] E_2

$E_2 = -\frac{E_1 a}{\overline{A A_1}}$ $\quad AA_2 \cdot AA_1 = a^2$ $\quad$ [illegible] $= \frac{E}{a}$ [illegible] $= 0$

[illegible] $\frac{E'}{b}$ [illegible] A

9A

$e_1' = -\frac{e'a}{BA}$ [illegible] A_1' [illegible]: $AA_1' \cdot AB = a^2$

$e_2' = -\frac{e_1' b}{A_1'B}$ ... A_2' ... : $BA_2' \cdot BA_1' = b^2$ etc.

A [illegible]: $e + e_2 + e_4 \dots + e_1' + e_3' + \dots$

B : $e' + e_1 + \dots + e_2' + \dots$

[illegible] Cond. [illegible]

$E = e + e_2 \dots + e_1' + \dots = ?$

$E' = e' + e_2' + \dots + e_1 + e_3 \dots$

[illegible] AB [illegible] R [illegible] $= 1006$ [illegible] R [illegible] $e_1 = \frac{e}{10}$ $e_2 \neq \frac{e}{100}$

[illegible] conv. [illegible] $\frac{1}{1000}$ [illegible]

$$A: \frac{e \cdot e'}{(AB)^2} + \frac{e \cdot e_1}{(AA_1)^2} + \frac{e \cdot e_2'}{(AA_2')^2} + \dots$$

$$+ \frac{e_2 e'}{(A_2B)^2} + \frac{e_2 e_1}{(A_2A_1)^2} + \frac{e_2 \cdot e_2'}{(A_2A_2')^2} + \dots$$

$$+ \frac{e_1' e'}{(A_1'B)^2} + \dots$$

[illegible]

[illegible]

$A \dots B$: $\rightarrow \frac{e e'}{AB^2} + \frac{e e'}{AA_1^2} \leftarrow A \dots A_1$

$+ \frac{e' e_1'}{BA_1'^2}$ —— BA_1

$E = e + e_1'$

$E' = e' + e_1$

[illegible] $a = b$, $\mathfrak{e} = \mathfrak{e}'$, $AB = c$

$$\mathfrak{e}_1 = -\frac{\mathfrak{e}a}{c} \qquad \mathfrak{e}_1' = -\frac{\mathfrak{e}a}{c}$$

$$AA_1 = c - \frac{a^2}{c} \qquad BA_1' = c - AA_1' = c - \frac{a^2}{c}$$

$$\frac{\mathfrak{e}^2 a}{c^2} - \frac{\mathfrak{e}^2 a}{c\left(c-\frac{a^2}{c}\right)^2} + \frac{\mathfrak{e}^2 a}{c\left(c-\frac{a^2}{c}\right)^2} = \mathfrak{e}^2\left[\frac{1}{c^2} - \frac{2a}{c\left(c-\frac{a^2}{c}\right)^2}\right]$$

$$= \mathfrak{e}^2\left[\frac{1}{c^2} - \frac{2a}{c^3\left(1-\frac{a^2}{c^2}\right)^2}\right] = \frac{\mathfrak{e}^2}{c^2}\left[1 - \frac{2a}{c}\right]$$

$$\mathfrak{E} = \mathfrak{e} + \mathfrak{e}_1' = \mathfrak{e} - \frac{\mathfrak{e}a}{c} = \mathfrak{e}\left(1 - \frac{a}{c}\right)$$

$$\mathfrak{e} = \frac{\mathfrak{E}}{1-\frac{a}{c}} \qquad \frac{\frac{\mathfrak{E}^2}{c^2}\left(1-\frac{2a}{c}\right)}{\left(1-\frac{a}{c}\right)^2}$$ [illegible]

[illegible] Cos [illegible] $\frac{1}{100}$ [illegible].

[illegible] 10 [illegible] Rad. [illegible] 1–2 %

[illegible]

1/12 [illegible] Pot. [illegible] Arbeit. [illegible]

(diagram: m_1, m_2, r, r_1, r_0)

$$\frac{m_1 m_2}{r^2} = \text{[illegible]}$$

$$\int_{r_0}^{r_1} \frac{m_1 m_2}{r^2}\,dr = \text{[illegible]}\ r_0 - r_1 = A$$

$$-\frac{m_1 m_2}{r}\Big|_{r_0}^{r_1} = A$$

$$A = -\frac{m_1 m_2}{r_1} + \frac{m_1 m_2}{r_0} = \text{[illegible] Pot. [illegible]}$$

[illegible]

[illegible] $K \frac{mc^2}{2}$ = [illegible] Pot.

[illegible] m_2 [illegible] r_0; [illegible]

[illegible] m_2 [illegible] pond.

[illegible] r_0 [illegible]

[illegible]

[illegible] r_1 [illegible] ∞ [illegible]

$$\frac{m_1 m_2}{r_1} = 0$$

$$V = \frac{m_1 m_2}{r_0}$$ [illegible]

$-V$ [illegible]

[illegible] V [illegible] ∞

[illegible] r_0 [illegible] V [illegible]

r_1, m_2, r, m_2, r_0, m_1

[illegible] m_2 [illegible] m_2' [illegible] V?

φ

$$\frac{m_1 m_2}{r^2} \cos\varphi \, ds = \quad \Big| \cos\varphi = \frac{dr}{ds}$$

$$= \frac{m_1 m_2}{r^2} \frac{dr}{ds} ds = \frac{d}{ds}\left(-\frac{m_1 m_2}{r}\right) ds$$

$$A = -\int \frac{d}{ds}\left(\frac{m_1 m_2}{r}\right) ds = -\frac{m_1 m_2}{r}\Big|_{A_0}^{A} = -\frac{m_1 m_2}{r_1} + \frac{m_1 m_2}{r_0}$$

[illegible] V [illegible]

[illegible] V [illegible]

m_1, m_2, m_3, m_4, r_{12}, r_{23}, r_{13}

$$\frac{m_1 m_2}{r_{12}}$$ [illegible] m_2 [illegible] ∞ [illegible] m_3

$$\frac{m_1 m_3}{r_{13}} + \frac{m_2 m_3}{r_{23}}$$ [illegible]

$$\frac{m_1 m_4}{r_{14}} + \frac{m_2 m_4}{r_{24}} + \frac{m_3 m_4}{r_{34}}$$ etc. = Energie [illegible]

[illegible] 220 [illegible] Pot. [illegible]

El. Energie [illegible]

$$A = \frac{m_1 m_2}{r_{12}} + \frac{m_1 m_3}{r_{13}} + \frac{m_1 m_4}{r_{14}} + \cdots$$

$$+ \frac{m_2 m_3}{r_{23}} + \frac{m_2 m_4}{r_{24}} + \cdots$$

$$+ \frac{m_3 m_4}{r_{34}} + \cdots$$

$$+ \cdots$$

Comb. [illegible]

[illegible] △ [illegible] □ [illegible] 2 [illegible]

$$2A = \frac{m_1 m_2}{r_{12}} + \frac{m_1 m_3}{r_{13}} + m \cdots$$

$$+ \frac{m_2 m_1}{r_{21}} + \frac{m_2 m_3}{r_{23}} + \cdots$$

$$+ \frac{m_3 m_1}{r_{13}} + \frac{m_3 m_2}{r_{23}} + \cdots$$

$$+ \cdots$$

Comb. [illegible]

$$2A = m_1 \left(\frac{m_2}{r_{12}} + \frac{m_3}{r_{13}} + \cdots \right)$$

$$+ m_2 \left(\frac{m_1}{r_{12}} + \frac{m_3}{r_{23}} + \cdots \right)$$

$$+ \cdots$$

$\left(\frac{m_2}{r_{12}} + \frac{m_3}{r_{13}} + \cdots \right)$ = Pot. [illegible] m_1 $= P_1$

$\left(\frac{m_1}{r_{12}} + \frac{m_3}{r_{23}} + \cdots \right) = P_2$

$$2A = m_1 P_1 + m_2 P_2 + \cdots$$

El. [illegible]

[illegible] P_1, P_2 etc. [illegible]

$P_1 = P_2 = \cdots = P$ [illegible]

$$2A = (m_1 + m_2 + \cdots) P = \Sigma P$$

[illegible]

P_1

P_2

$A = \frac{eP}{2}$ $\qquad P = \frac{e}{a}$ [illegible]

$A = \frac{e^2}{2a}$ [illegible]

[illegible] $\frac{e^2}{2a}$ [illegible]

[illegible];

[illegible];

[illegible] Aequiv. $= \frac{e^2}{2a}$.

---

e' P' e'' P''

[illegible]

$2A = e'P' + e''P''$

[illegible]

I. [illegible] Energie [illegible]

[illegible] P'' [illegible]

II [illegible] [isolirt] [illegible] + [illegible]

[illegible] $= 0$ [illegible]

[illegible] isol. [illegible] isol. [illegible]

2/12

e O e' A C p

− + [illegible] e' [illegible] indu[illegible]

[illegible] 3 Pot. [illegible]

[illegible] A [illegible]

$p \cdot \overline{AC} = a^2$

$e' = \frac{ea}{p}$

I. $p = \infty$ [illegible]?

[illegible];

[illegible] $P = \frac{e}{a}$; [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] induc. [illegible]

[illegible]

II. [illegible]

[illegible]

[illegible]

$$A = \frac{e}{2}\left(-\frac{e'}{OA} + \frac{e'}{OC}\right)$$

$$= \frac{e}{2}\left(-\frac{ea}{r}\,\frac{1}{r-\frac{a^2}{r}} + \frac{ea}{rr}\right)$$

$$A = -\frac{e^2 a}{2(r^2-a^2)} + \frac{e^2 a}{2r^2}$$ [illegible]

[illegible] $= 0$ [illegible]

LK = A

[illegible]

[illegible] $+ e'$ [illegible]

$$A' = -\frac{e^2 a}{2(r^2-a^2)}$$ [illegible]

[illegible]

[illegible]

[illegible] $\frac{ea}{r}$ [illegible]

[illegible] $-\frac{ea}{2r}\left(-\frac{e}{r}\right) = \frac{e^2 a}{2r^2}$

$p = \infty \quad A'' = \frac{e^2 a}{2p^2}$ [illegible] $+$ [illegible]

[illegible] $= \frac{e^2 a}{2(p^2 - a^2)} + \frac{e^2 a}{2p^2}$ [illegible]

[illegible]

[illegible] $2\,\frac{e^2 a}{r}$ [illegible] $\frac{e^2 a}{2p}$ [illegible]

[illegible] $\frac{e^2 a}{2p^2}$ [illegible]

2 [illegible] + [illegible]

[illegible]

[illegible] [Influenz [illegible]].

[illegible]

e 0 — $\frac{ea}{r}$

e

[illegible] + [illegible] $\frac{ea}{r}$ [illegible]

[illegible] Pot. [illegible]

$\frac{ea}{r} = e'$

[illegible]

$\frac{q}{r} = \frac{e' - q}{a}$ [illegible] Pot. —

$\frac{q}{r} + \frac{q}{a} = \frac{e'}{a}$

$q\,\frac{r+a}{ar} = \frac{e'}{a} \;\Big|\; q = \frac{e' r}{a + r}$

[illegible] $\frac{q}{r}$ [illegible] Pot. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$q + q' = \frac{q}{a}$ [illegible]

[illegible] $\frac{q}{r} = \frac{q'}{a}$

[illegible]

3/12

[illegible]

$+e$ ... $-e$

[illegible]

[shorthand] Rob. [shorthand]

[shorthand] P + S [shorthand]

[shorthand] Töpler [shorthand]

P + S [shorthand]

[shorthand] 12.

A [shorthand] A + δA [shorthand] [+] δA [shorthand]

$$A = -\frac{1}{2}\frac{q^2 a}{p^2 - a^2} + \frac{1}{2}\frac{q^2 a}{p^2}$$ [shorthand]

q p c

$$A' = A + \delta A = A + \frac{dA}{dp}\delta p$$

A [shorthand]

$\frac{dA}{dp} = /$ $\quad \delta p = \infty$

[illegible] $\frac{dA}{dp}$ [illegible]

$$K = -\frac{dA}{dp}$$

$$\frac{dA}{dp} = \frac{e^2 a\, p}{(p^2-a^2)^2} - \frac{e^2 a}{p^3}$$

$$K = -\frac{e^2 a p}{(p^2-a^2)^2} + \frac{e^2 a}{p^3}$$ [illegible]

$$= -\frac{e^2 a}{p\left(p - \frac{a^2}{p}\right)^2} + \frac{e^2 a}{p}\frac{1}{p^2}$$

$\frac{e a}{p} = e'$ = [illegible]

$$K = -\frac{e e'}{\left(p - \frac{a^2}{p}\right)^2} + \frac{e e'}{p^2}$$ [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

$\frac{dA}{da}\, da$ [illegible]

[illegible]

[illegible] $\frac{dA}{da}$ [illegible]

$$\frac{dA}{da} = -\frac{1}{2}\frac{e^2}{p^2-a^2} + \frac{e^2 a^2}{(p^2-a^2)^2} + \frac{1}{2}\frac{e^2}{p^2}$$

$\frac{dA}{da}$ [illegible]

[illegible]

4/12

$\overline{AB} = c$

Diagram labels: a, A, A_2, A_1, B, b

[shorthand]

[shorthand] $P = \frac{e}{a}$ [shorthand] B [shorthand]

[shorthand] A_1 [shorthand] $e_1 = -\frac{eb}{c}$; e_1 [shorthand]

[shorthand] $e_2 = -\frac{e_1 a}{A_1 A}$ [shorthand] $e_3 = -\frac{e_2 b}{A_2 B}$ [shorthand]

[shorthand] B [shorthand] A

e_1 [shorthand] e_2 [shorthand]

e_3 [shorthand] e_4

[shorthand] B [shorthand] A [shorthand]

A $e_1' = -\frac{e' a}{c}$ [shorthand] B_1 [shorthand]

$e_2' = -\frac{e_1' b}{B_1 B_2}$ [shorthand]

$e_3' = -\frac{e_2' a}{B_2 A}$ [shorthand]

$A_1 B = \frac{b^2}{c}$

$A_2 A_1 = \frac{a^2}{A_1 A}$

$AB_1 = \frac{a^2}{c}$

$BB_2 = \frac{b^2}{BB_1}$

$A_1 A = c - A_1 B$

$= c - \frac{b^2}{c}$

$B_1 B = c - \frac{a^2}{c}$

$A_2 B = c - \frac{a^2}{A_1 A} = c - \frac{a^2}{c - \frac{b^2}{c}}$

$B_2 A = c - \frac{b^2}{c - \frac{a^2}{c}}$

$e_1 = -\frac{eb}{c}$

$e_1' = -\frac{e' a}{c}$

$e_2 = +\frac{eb}{c} \frac{a}{c - \frac{b^2}{c}}$

$e_2' = \frac{e' a}{c} \cdot \frac{b}{c - \frac{a^2}{c}}$

$$\varepsilon_3 = -\frac{\varepsilon b}{c}\,\frac{a}{c-\frac{b^2}{c}}\,\frac{b}{c-\frac{a^2}{c-\frac{b^2}{c}}} \qquad \varepsilon_3' = \text{———}$$

[illegible]:

$$\varphi^{\text{[illegible]}} = \varepsilon + \varepsilon_2 + \cdots\cdots \quad + \varepsilon_1' + \varepsilon_3' + \cdots$$

$$= \varepsilon + \frac{\varepsilon\, ab}{c^2-b^2} + \cdots\cdots \quad - \frac{\varepsilon a}{c} - \cdots$$

$$= \varepsilon\left[1 + \frac{ab}{c^2-b^2} + \cdots\right] - \varepsilon\left[\frac{a}{c} + \cdots\right]$$

$$\varphi = Pa\left[1 + \frac{ab}{c^2-b^2} + \cdots\right] - P'b\left[\frac{a}{c} + \cdots\right]$$

$$\varphi' = P'b\left[1 + \frac{ab}{c^2-a^2} + \cdots\right] - Pa\left[\frac{b}{c} + \cdots\right]$$

Energie?

$$A = \frac{P\varphi}{2} + \frac{P'\varphi'}{2}$$ [illegible]

[illegible] $P\varphi$;

$$\left.\begin{aligned}\varphi &= \alpha P - \gamma P' \\ \varphi' &= \beta P' - \gamma P\end{aligned}\right\}\begin{matrix}\beta\\ \gamma\end{matrix}$$

$$\beta\varphi + \gamma\varphi' = (\alpha\beta - \gamma^2)P$$

$$P = \frac{\beta\varphi + \gamma\varphi'}{\alpha\beta - \gamma^2}$$

$$P' = \frac{\alpha\varphi' + \gamma\varphi}{\alpha\beta - \gamma^2}$$

$$A = \frac{1}{2}\,\frac{1}{\alpha\beta-\gamma^2}\left[\beta\varphi^2 + \alpha\varphi'^2 + 2\gamma\varphi\varphi'\right]$$

[illegible]

[illegible] $\alpha = a\left[1 + \frac{ab}{c^2}\right]$ [illegible]

$$\beta = b\left[1 + \frac{ab}{c^2}\right] \qquad \gamma = \frac{ab}{c}$$

$$\alpha\beta = ab\left[1 + \frac{2ab}{c^2}\right]$$

$$\gamma^2 = ab \cdot \frac{ab}{c^2}$$

$$\alpha\beta - \gamma^2 = ab\left[1 + \frac{ab}{c^2}\right]$$

$$A = \frac{1}{2ab\left[1+\frac{ab}{c^2}\right]}\left[b\left(1+\frac{ab}{c^2}\right)\varphi^2 + a\left(1+\frac{ab}{c^2}\right)\varphi'^2 + 2\frac{ab}{c}\varphi\varphi'\right]$$

$$= \frac{\varphi^2}{2a} + \frac{\varphi'^2}{2b} + \frac{\varphi\varphi'}{c\left[1+\frac{ab}{c^2}\right]}$$

$$A = \frac{\varphi^2}{2a} + \frac{\varphi'^2}{2b} + \varphi\varphi'\left[\frac{1}{c} - \frac{ab}{c^3}\right]$$

$$\frac{dA}{dc} = \varphi\varphi'\left[-\frac{1}{c^2} + \frac{3ab}{c^4}\right]$$

$-\frac{dA}{dc} =$ [illegible] $= \frac{\varphi\varphi'}{c^2}\left[1 - \frac{3ab}{c^2}\right]$ [illegible] Coul. [illegible]

[illegible] $c = 10a = 10b$ [illegible] Cor. $= \frac{3}{100}$

[illegible] $r = \frac{1}{5}c$ [illegible] Corr. $= \frac{12}{100}$

[illegible] aeq. [illegible] φ [illegible] φ^2 [illegible] φP

[illegible] aeq. [illegible] e^2 [illegible] Pot. [illegible] = aeq. [illegible]

9/12 Magnetismus

Magn. [illegible]

[illegible] 12 Jh. [illegible] Comp. [illegible] Chinesen [illegible]

[illegible] 16 Jh. [illegible] Hartmann [illegible] Nürnberg [illegible]

[illegible] Gilbert [illegible]

[illegible] Coulomb [illegible] Jh. [illegible]

[[illegible] Newton [illegible]]

[illegible] Flunde + s – [illegible]

[illegible]

[illegible] + s – [illegible]

[illegible]

[illegible]

[illegible]

[illegible] [Robert?]:

[illegible]

S NS NS NS NS N

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] Erde [illegible] $= \mathfrak{E}$

[illegible] $m \quad = m\,\mathfrak{E}$

m m' m''

$\uparrow =$ [illegible] $(\alpha\beta\gamma)$

$m\,\mathfrak{E}\cos\alpha =$ Comp. $\parallel X$ [illegible]

$m'\,\mathfrak{E}\cos\alpha$

Y, X, Z

$X = \Sigma\, m\,\mathfrak{E}\cos\alpha$

$Y = \Sigma\, m\,\mathfrak{E}\cos\beta$

$Z = \Sigma\, m\,\mathfrak{E}\cos\gamma$

Res. [illegible]

[illegible]

$\Sigma X = 0$

$\ell \cos\alpha \, \Sigma m = 0$

$\Sigma m = 0$ [illegible]

Z, C, A, m, X, Y [illegible]

$A = m\ell\cos\alpha$

$C = m\ell\cos\gamma$

$m\ell z\cos\alpha - m\ell x\cos\gamma$

$m'\ell z'\cos\alpha - m'\ell x'\cos\gamma$

$\Sigma\left[m\ell z\cos\alpha - m\ell x\cos\gamma\right]$

Y— $\ell\cos\alpha\,\Sigma mz - \ell\cos\gamma\,\Sigma mx$ = [illegible] Y

Z— $\ell\cos\beta\,\Sigma mx - \ell\cos\alpha\,\Sigma my$

X— $\ell\cos\gamma\,\Sigma my - \ell\cos\beta\,\Sigma mz$

$\Sigma mx =$ [illegible] X

10/12 $\Sigma mx = A$ [illegible]

$\Sigma my = B$

$\Sigma mz = C$

m, O, O', X

$x' = x - a$

$\Sigma mx' = \Sigma m(x-a)$

$= \Sigma mx - \Sigma ma$

$= \Sigma mx - a\Sigma m$

$= \Sigma mx$

[illegible]

Z, M, L, O, X, Y, $\lambda\mu\nu$

$l = x\cos\lambda + y\cos\mu + z\cos\nu$

Σml = [illegible] L

$= \cos\lambda\,\Sigma mx + \cos\mu\,\Sigma my + \cos\nu\,\Sigma mz$

$\Sigma m l = A \cos\lambda + B \cos\mu + C \cos\nu$ [illegible]

$= $ [illegible]

$A B C$ [illegible]

$$\frac{A}{\sqrt{A^2+B^2+C^2}} = \cos a$$

$$\cos^2 a + \cos^2 b + \cos^2 c = 1$$

$$\frac{B}{\sqrt{\quad}} = \cos b$$

[illegible] abc [illegible]

$$\frac{C}{\sqrt{\quad}} = \cos c$$

$$\sqrt{A^2+B^2+C^2} = M \qquad A = M\cos a$$

$$B = M \cos b$$

$$C = M \cos c$$

$$\Sigma m l = M(\underbrace{\cos a \cos\lambda + \cos b \cos\mu + \cos c \cos\nu})$$

$\cos$ [illegible] abc $\lambda\mu\nu$

$$= M \cos\theta$$

[illegible] M [illegible]

[illegible] $a\, b\, c$ [illegible]

$M =$ [illegible]

[illegible] $= 0$.

[illegible] abc [illegible] [[illegible]]

$M =$ [illegible] ([illegible]).

[illegible] [illegible] [[illegible] $= 0$]

m', m', μ_1, μ_2

$$A = \Sigma m x = \Sigma m' \xi' - \Sigma m'' \xi''$$

$$\xi_1 = \frac{\Sigma m' \xi'}{\Sigma m'} \qquad \xi_2 = \frac{\Sigma m'' \xi''}{\Sigma m'}$$

$$A = \xi_1 \Sigma m' - \xi_2 \Sigma m'' \qquad \Sigma m' = \Sigma m''$$

$$A = (\xi_1 - \xi_2)\Sigma m'$$

$$B = (\eta_1 - \eta_2)\Sigma m' \qquad C = (\xi_1 - \xi_2)\Sigma m'$$

$$\frac{A}{\sqrt{A^2+B^2+C^2}} = \frac{\xi_1 - \xi_2}{\sqrt{(\xi_1-\xi_2)^2+(\eta_1-\eta_2)^2+(\zeta_1-\zeta_2)^2}} = \cos a$$

[illegible]

[illegible]

[illegible]

Z — O — X ($-m_1$, $-m_2$ … $+m_1$, $+m_2$)

[illegible]

$C = \Sigma mz$ [illegible]

$= mz - mz$ - - - - [illegible]

$= 0$ [illegible]

[illegible] $B = 0$ [illegible]

[illegible] $A = \Sigma mz =$ [illegible] $= M$

[illegible]

[illegible] : $\cos\gamma$ [illegible] $\Sigma my - \cos\beta\, \Sigma mz$

$= \cos\gamma\, B - \cos\beta\, C$

$= M\cos\gamma\cos b - M\cos\beta\cos c =$ [illegible]

$= M(\cos\gamma\cos b - \cos\beta\cos c)$

$\cos\beta\cos b - \cos\beta\cos c = 0$ } [illegible]

$\cos\alpha\cos c - \cos\gamma\cos b = 0$ } ___ [illegible]

$\cos\beta\cos a - \cos a\cos a = 0$ } ___ [illegible]

[illegible]

$\frac{\cos\gamma}{\cos c} = \frac{\cos\beta}{\cos b}$

$\frac{\cos\alpha}{\cos a} = \frac{\cos\gamma}{\cos c}$

$\frac{\cos\beta}{\cos b} = \frac{\cos\alpha}{\cos a}$

$$\frac{\cos\alpha}{\cos a} = \frac{\cos\beta}{\cos b} = \frac{\cos\gamma}{\cos c} = \frac{\sqrt{\cos^2\alpha+\cos^2\beta+\cos^2\gamma}}{\sqrt{\cos^2 a+\cos^2 b+\cos^2 c}} = 1$$

$\cos\alpha = \cos a$
$\cos\beta = \cos b$
$\cos\gamma = \cos c$
} [illegible]

[illegible]

[illegible] – vert. – hor. [illegible]

11/12 [illegible] Period.

[illegible] vert. [illegible] Period.

[illegible] astr. [illegible] Declinations [illegible]

[illegible] H [illegible] Inclination.

[illegible] 2 Comp. [illegible]

vert. Eb.

O, C, i, ℰ, B, A

$OC = ℰ \cos i$ = Horizontalcomp.

$OB = ℰ \sin i$ = Verticalcomp.

Hor. Eb.

H, m, φ, B, A, μ

$\mu H = /$ [illegible]

$H \frac{\Sigma m'}{\mu} = \mu H$

μH

$\mu H \cdot OA + \mu H \cdot OB =$ [illegible]

$\mu H \; AB =$

$\mu H (\overline{mm}) \sin\varphi =$

$\mu(\xi_1 - \xi_2) =$ [illegible]

$-MH\sin\varphi =$ [illegible] H. comp.

[illegible] $f = 0$ [illegible] $\varphi = 0$.

[illegible] $\angle\varphi$ [illegible]

[illegible]

[illegible] Inclinationsnadel
Verl. Z.

$-\mu H\lambda'\sin\varphi - \mu H\lambda''\sin\varphi$ } [illegible] H. comp.

$-\mu(\lambda'+\lambda'')H\sin\varphi$

$-MH\sin\varphi$

$\mu V\lambda'\cos\varphi + \mu V\lambda''\cos\varphi$ } [illegible] V. comp.

$= MV\cos\varphi$

$-MH\sin\varphi + MV\cos\varphi = 0$ [illegible]

$H\sin\varphi = V\cos\varphi$

$\mathfrak{E}\cos i\sin\varphi = \mathfrak{E}\sin i\cos\varphi$

$\tan\varphi = \tan i$

$\varphi = i$ [illegible] Incl. $\angle$ [illegible]

[illegible]

[illegible]:

$-p\alpha\cos\varphi$

$-MH\sin\varphi + MV\cos\varphi - p\alpha\cos\varphi = 0$

$-M\mathfrak{E}\cos i\sin\varphi + M\mathfrak{E}\sin i\cos\varphi - p\alpha\cos\varphi = 0$

$$\tan\varphi = \frac{M\mathfrak{E}\sin i - p\alpha}{M\mathfrak{E}\cos i} =$$

$$= \tan i - \frac{p\alpha}{M\mathfrak{E}\cos i}$$

$\varphi < i$

[illegible] $\varphi = 0$ [illegible]

$MV - p\alpha = 0$

$p\alpha = MV$

[illegible]

[illegible]

[illegible]

180° [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

15/12

Z

μ'

O X [illegible] H, Comp. [illegible]

φ

μ H

$$-\mu H(\overline{O\mu})\sin\varphi + \mu V(\overline{O\mu})\cos\varphi = 0$$

$$-\mu' H(\overline{O\mu'})\sin\varphi + \mu' V(\overline{O\mu'})\cos\varphi = 0$$

$$+ -HM\sin\varphi + VM\cos\varphi = 0$$

Z

X

O ω

μ D

[illegible]

[illegible] H comp. / H [illegible] H cos ω

$$-\mu H\cos\omega\, M\sin\varphi + VM\cos\varphi = 0$$

$$\operatorname{tg}\varphi = \frac{V}{H\cos\omega} = \frac{E\sin i}{E\cos i\cos\omega} =$$

$$= \frac{\operatorname{tg} i}{\cos\omega}$$

$\cos\omega \leqq 1$

$\operatorname{tg}\varphi \geqq \operatorname{tg} i$

$\omega = 90 \quad \varphi = 90°$

$\omega = 0 \quad \varphi = i$ = Inc.

[illegible] 16 [illegible]

[illegible] vert. [illegible]

[illegible] vert. [illegible]

[illegible] [[illegible] S 6]. [illegible]

[illegible] Torsion [illegible]

φ H μ O

$$-\mu H(\overline{O\mu})\sin\varphi + \mu' H(\overline{O\mu'})\sin\varphi = 0$$

$$-MH\sin\varphi$$

[illegible]

$K =$ [illegible]

$$K \frac{d^2\varphi}{dt^2} = - MH \sin\varphi$$

[illegible]

[illegible] $\frac{g}{l} = \frac{MH}{K}$

$$\tau = \pi \sqrt{\frac{l}{g}}$$

$$\tau = \pi \sqrt{\frac{K}{MH}}$$

[illegible]:

$$mg\, l \sin\varphi = -K \frac{d^2\varphi}{dt^2}$$

$$K = m l^2$$

$$m l^2 \frac{d^2\varphi}{dt^2} = - mgl \sin\varphi$$

$$\frac{d^2\varphi}{dt^2} = - \frac{g}{l} \sin\varphi$$

l, m, mg, φ

[illegible] germ. [illegible]

[illegible] MH [illegible]

[illegible] Incl. [illegible] Decl. [illegible] MH [illegible]

[illegible] Incl. [illegible]

[illegible] Torsion [illegible] Tors. [illegible]:

$$K \frac{d^2\varphi}{dt^2} = - \mu H \sin\varphi + \alpha\, \varphi - \beta \frac{d\varphi}{dt}$$

[illegible] indne. [illegible]

[illegible] Pol. [illegible]

[illegible] Torsions[illegible]:

$F =$ Torsions[illegible] [illegible]

$(F - \varphi)\alpha$ [illegible]?

$$K \frac{d^2\varphi}{dt^2} = - \mu H \sin\varphi + \alpha (F - \varphi) - \beta \frac{d\varphi}{dt}$$

φ, F

r_2 r_1 c x

$$U = \mu \lg \frac{r_2 + x + c}{r_1 + x - c}$$

$$r_1^2 = (x-c)^2 + y^2$$
$$r_2^2 = (x+c)^2 + y^2$$
$$r_2^2 - r_1^2 = 4cx$$

$$= \mu \lg \frac{4c r_2 + r_2^2 - r_1^2 + 4c^2}{4c r_1 + r_2^2 - r_1^2 - 4c^2}$$

$$= \mu \lg \frac{(r_2 + 2c)^2 - r_1^2}{(r_1 - 2c)^2 + r_2^2} = \mu \lg \frac{r_1 + r_2 + 2c}{r_1 + r_2 - 2c}$$

$$\frac{r_2 + x + c}{r_1 + x - c} \qquad \frac{r_1 - x + c}{r_2 + x - c}$$

str. patrz Stefan

Punkt elektr. przed niem dielektrikum!

2 1 r' r e l l

$$U_1 = \frac{e}{r} - \frac{K-1}{K+1} e \frac{1}{r'}$$

$$U_2 = \frac{2}{K+1} \frac{e}{r}$$

} Spełnione warunki graniczne dla $r = r'$

$$U_1 = U_2$$

$$\frac{\partial U_1}{\partial x} = K \frac{\partial U_2}{\partial x}$$

wtedy przyciąganie punktu e ku granicy $= \frac{K-1}{K+1} \frac{e^2}{4l^2}$

wszystkimi

potrzeba dispozycj. obst. wystarczają

$$U = \frac{E}{2ab^2}\int\frac{\cos\theta\, d\theta}{\frac{1}{a^2}+\left(\frac{1}{a^2}-\frac{1}{b^2}\right)\cos\theta} = \frac{E}{2ab}\log\frac{1+\sqrt{\frac{b^2}{a^2}-1}\,\cos}{1+\sqrt{(\quad)}\,\cos}\Bigg|_0^1 = \frac{E}{}\log\frac{a-\sqrt{b^2-a^2}}{a+\sqrt{--}}$$

$$\int\frac{d\alpha}{\cos\alpha} = \int\frac{d\sin\alpha}{\sqrt{1-\sin^2\alpha}} = \log\frac{1+\sin\alpha}{1+\cos\alpha}\Bigg|$$

$$\frac{\sin\alpha+\cos\alpha}{\sin\alpha-\cos\alpha} =$$

$$\frac{1+\sin\alpha_2}{1-\sin\alpha_2}\cdot\frac{1-\sin\alpha_1}{1+\sin\alpha_1}\qquad \int\frac{d\alpha}{\cos\alpha} = \int\frac{d\sin\alpha}{1-\sin^2\alpha}$$

Pojemność drutu [illegible]

$$C = \frac{l}{2\log\frac{l}{\rho}}$$

$$\text{arctg}(\alpha+i\beta) = x+iy$$

$$= \text{tg}\,x + \frac{e^{-y}-e^{y}}{e^{-y}+e^{y}}$$

$$1-\text{tg}\,x\cdot\frac{e^{-y}-e^{y}}{e^{-y}+e^{y}}$$

$$C = \frac{\sqrt{a^2-b^2}}{\log\sqrt{\frac{a^2+\sqrt{a^2-b^2}}{a^2-\sqrt{a^2-b^2}}}} = \frac{2\sqrt{a^2-b^2}}{\log\left(\frac{2}{1-\frac{b^2}{a^2}}\right)} =$$

$$C = \frac{\sqrt{b^2-a^2}}{\text{arctg}\sqrt{\frac{b^2}{a^2}-1}} = \frac{i\sqrt{a^2-b^2}}{\text{arctg}\, i\sqrt{1-\frac{b^2}{a^2}}}$$

$$\text{arctg}\, i\varphi = xi$$

$$i\varphi = \text{tg}\,xi = \frac{e^{-x}-e^{x}}{i(e^{-x}+e^{x})}$$

$$\varphi = \frac{e^{x}-e^{-x}}{e^{x}+e^{-x}}$$

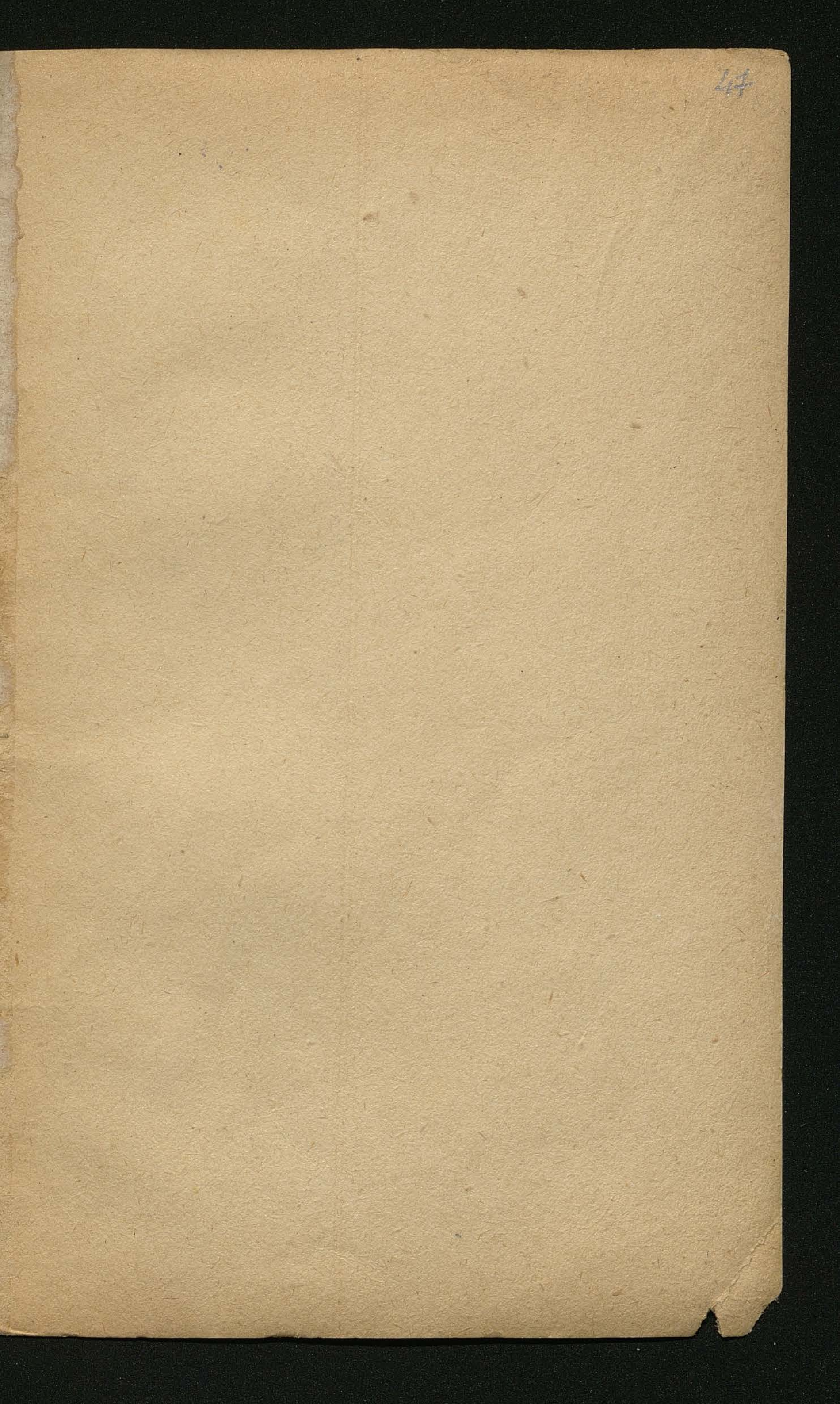
$$e^{2x}\varphi + \varphi = e^{2x}-1$$

$$e^{2x} = \frac{1+\varphi}{1-\varphi}$$

$$x = \frac{1}{2}\log\frac{1+\varphi}{1-\varphi}$$

$f(h) = f(0) + \frac{h}{1!} f'(0)$

$fh =$



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II.

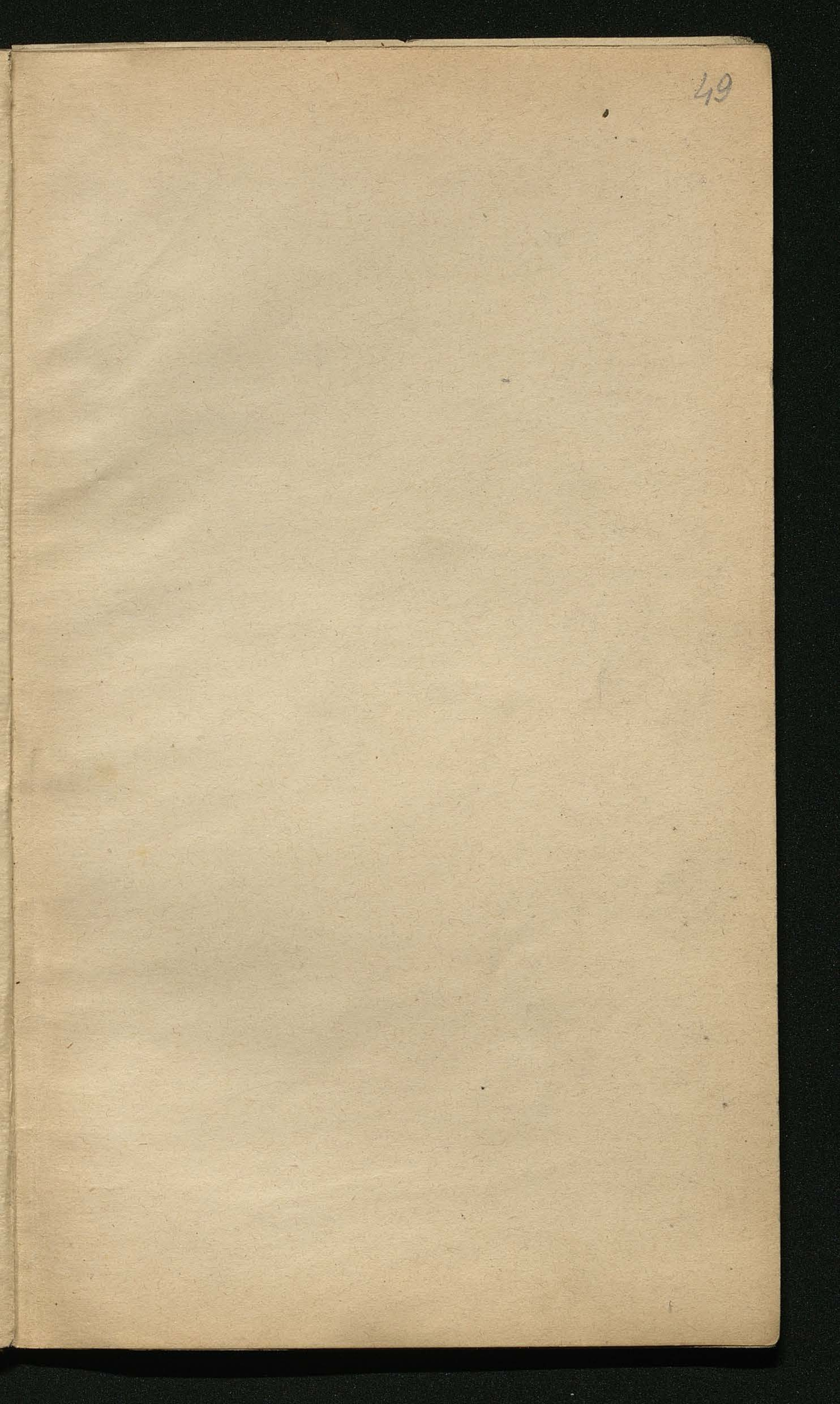
III S. 91/92

Dr. Josef Stefan

Magnetismus u. Elektricität

M Smoluchowski

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$$K\frac{d^2\varphi}{dt^2} = -MH\varphi + (f-\varphi)\alpha - \beta\frac{d\varphi}{dt}$$

$$\frac{d^2\varphi}{dt^2} = -\frac{MH}{K}\varphi + \frac{\alpha}{K}(f-\varphi) - \frac{\beta}{K}\frac{d\varphi}{dt}$$

$$= -\frac{MH+\alpha}{K}\varphi + \frac{\alpha f}{K} - \frac{\beta}{K}\frac{d\varphi}{dt}$$

$$\frac{MH+\alpha}{K} = a^2 \qquad \frac{\beta}{K} = 2b$$

$$\varphi = \varphi_0 + u$$ [illegible]

$$\frac{d^2u}{dt^2} = -a^2\varphi_0 - a^2u + \frac{\alpha f}{K} - 2b\frac{du}{dt}$$

$$-a^2\varphi_0 + \frac{\alpha f}{K} = 0$$ [illegible] ; $\varphi_0 =$ [illegible]

[illegible] rund.

$$\frac{d^2u}{dt^2} = -a^2u - 2b\frac{du}{dt}$$

$$\frac{d^2u}{dt^2} + 2b\frac{du}{dt} + a^2u = 0 \qquad u = Ae^{\lambda t}$$

$$\frac{du}{dt} = A\lambda e^{\lambda t}$$

$$Ae^{\lambda t}\left[\lambda^2 + 2b\lambda + a^2\right] = 0$$

$$\frac{d^2u}{dt^2} = A\lambda^2 e^{\lambda t}$$

[illegible] A [illegible]

[illegible]

$$\lambda^2 + 2b\lambda + a^2 = 0$$ [illegible]

[illegible] const. B [illegible] A

$$\lambda = -b \pm \sqrt{b^2 - a^2}$$

$$u = e^{-bt}\left[Ae^{t\sqrt{b^2-a^2}} + Be^{-t\sqrt{b^2-a^2}}\right].$$

$t = \infty$ [illegible] $u = 0$

$b < a$

$\sqrt{a^2 - b^2} = c \qquad u = e^{-bt}\left[A e^{cti} + B e^{-cti}\right]$

$$u = e^{-bt}\left[(A+B)\cos ct + (A-B)i \sin ct\right]$$

$A + B = G \qquad (A-B)i = H$

$$u = e^{-bt}\left[G \cos ct + H \sin ct\right]$$

$\mathcal{E}$ [illegible] Ampl. & [illegible]

$$\frac{du}{dt} = -b e^{-bt}\left[G \cos ct + H \sin ct\right] + e^{-bt}\left[-cG \sin ct + cH \cos ct\right]$$

$t = 0$ | $u = U_0$ [illegible] $y = 0$

$\frac{du}{dt} = 0$

$u = U_0 = G \qquad \frac{du}{dt} = 0 = -bG + cH$

$$H = \frac{bG}{c} = \frac{bU_0}{c}$$

$$u = U_0 e^{-bt}\left[\cos ct + \frac{b}{c} \sin ct\right]$$

$$\frac{du}{dt} = e^{-bt} \sin ct \left[-bH - cG\right]$$

$$= -e^{-bt} \sin ct \, \frac{b^2 + c^2}{c} U_0$$

$$= -e^{-bt} \sin ct \cdot U_0 \frac{a^2}{c}$$

$t_1 \quad y \ \mathcal{E} = 0 \quad a \quad ct = \pi$

$t_2 \qquad ct_2 = 2\pi$

$$\tau = \pi \sqrt{\frac{K}{MH}}$$

$$\tau' = \pi \sqrt{\frac{K+k}{MH}}$$

$$\tau^2 = \frac{\pi^2 K}{MH}$$

$$\tau'^2 = \frac{\pi^2 (K+k)}{MH}$$

$$\tau'^2 - \tau^2 = \frac{\pi^2 k}{MH} \qquad \frac{\tau'^2 - \tau^2}{\pi^2 k} = \frac{1}{MH}$$

[illegible] $r = \frac{1}{2}$ $d = 15$

$$p d^2 + \frac{p}{2} r^2$$

$$k = 2 p d^2 + p r^2$$ [illegible]

[illegible] HM [illegible]

[illegible] $M'H$

[illegible] $\frac{M}{M'}$ [illegible]

$$K \frac{d^2\varphi}{dt^2} = - HM \varphi + \alpha (f - \varphi) - \beta \frac{d\varphi}{dt}$$

$\frac{d\varphi}{dt} = 0$ $\frac{d^2\varphi}{dt^2} = 0$ [illegible]

$$0 = - HM\varphi + \alpha (f - \varphi)$$

$$= -(HM + \alpha)\varphi + \alpha f$$

$$\varphi = \frac{\alpha f}{HM + \alpha} = \frac{f}{1 + \frac{HM}{\alpha}}$$ [illegible] $f = 0$ [illegible] φ [illegible]

[illegible] $\frac{HM}{500}$

[illegible]

$\varphi\, HM + \alpha\varphi = f\alpha$ [illegible]

$(HM+\alpha)(\varphi+\vartheta) = \alpha(f+u)$ [illegible] φ [illegible]

$(HM+\alpha)\, v = \alpha u$

[illegible] $\alpha : HM$

$\underline{t=0}$

$u = U_0$

$t_1 \quad u_1 = -U_0 e^{-bt_1}$ [illegible]

$t_2 \quad u_2 = U_0 e^{-bt_2}$ [illegible] t_1

— — — — — $t_1 =$ [illegible] $= \tau = \frac{\pi}{c} =$

$$t_1 = \frac{\pi}{\sqrt{a^2-b^2}}$$

$t = \frac{\pi}{a}$ [illegible] [illegible]

$= \frac{\pi \sqrt{\;}}{\sqrt{K}} = \pi \sqrt{\frac{K}{MH+\alpha}}$ [illegible] $t = \tau \sqrt{\frac{K}{MH}}$

[illegible]:

$e^{b\tau} = \frac{U_0}{-u_1} \qquad b = \frac{\ln \frac{U_0}{u_1}}{\tau}$

$b\tau =$ logarithm. Decrement [illegible]

$U_0 \quad u_1 = -U_0 e^{-b\tau}$

$u_2 = U_0 e^{-2b\tau}$

$u_3 = -U_0 e^{-3b\tau}$

— — —

$u_{10} = U_0 e^{-10b\tau}$ ~~U_0~~

$\frac{U_0}{u_{10}} = e^{-10 \cdot b\tau}$

$b = \text{---}$

MH --- [illegible]

[illegible] H [illegible] series [illegible]

[illegible]

Pot. [illegible]:

Pot. [illegible] M / $\xi\eta\zeta$

Y M R m m' O X Z

$m\begin{cases}x\\y\\z\end{cases}$

$$P = \sum \frac{m}{\sqrt{(\xi-x)^2+(\eta-y)^2+(\zeta-z)^2}}$$

[illegible]:

$$P = \sum \frac{m}{\sqrt{\xi^2+\eta^2+\zeta^2-2(x\xi+y\eta+z\zeta)+x^2+y^2+z^2}}$$

$$\xi^2+\eta^2+\zeta^2=R^2$$

$$P = \frac{1}{R}\sum \frac{m}{\sqrt{1-\frac{2(x\xi+y\eta+z\zeta)}{R^2}+\frac{x^2+y^2+z^2}{R^2}}}$$

$$= \frac{1}{R}\sum m\Big[1+\frac{x\xi+y\eta+z\zeta}{R^2}-\frac{1}{2}\frac{x^2+y^2+z^2}{R^2}+$$

$$+\frac{3}{8}\left\{-\frac{2(x\xi+y\eta+z\zeta)}{R^2}+\frac{x^2+y^2+z^2}{R^2}\right\}^2-\cdots\Big]$$

$$= \frac{1}{R}\overset{=0}{\sum m} + \frac{1}{R^3}\Big[\sum m(x\xi+y\eta+z\zeta) -\cdots$$

$$-\sum\frac{m}{2}(x^2+y^2+z^2)\Big]+\cdots$$

$$P = \frac{1}{R^3}\left[\xi\sum mx+\eta\sum my+\zeta\sum mz\right]\cdots$$

[illegible]

[illegible]

[illegible]

/12. $P = \dfrac{A\xi + B\eta + C\zeta}{R^3}$ [illegible]

$A = M \quad B = 0 \quad C = 0$

$P = \dfrac{M\xi}{R^3}$ [illegible]

$R^2 = \xi^2 + \eta^2 + \zeta^2$

S N O X

M ξ η ζ

$X = $ [illegible]

$= -\dfrac{\partial P}{\partial \xi}$

$= -\dfrac{M}{R^3} - 3\dfrac{M\xi}{R^4}\dfrac{dR}{d\xi}$

$= -\dfrac{M}{R^3} - 3\dfrac{M\xi^2}{R^5}$

$Z = -\dfrac{dP}{d\zeta} = \dfrac{M\xi\zeta}{R^5}$

263. [illegible] $R = \xi$

$X = -\left[\dfrac{M}{\xi^3} - 3\dfrac{M}{\xi^3}\right] = +2\dfrac{M}{\xi^3} \qquad Z = Y = 0$

[illegible] Y [illegible] Z

Magnetometer

[illegible]

[illegible]

S N H φ R X X φ

[illegible]

[illegible] H.comp.

$\psi = \varphi$ [illegible]

$\operatorname{tg}\psi = \dfrac{X}{H} = \operatorname{tg}\varphi$ $\qquad$ $\operatorname{tg}\varphi = \dfrac{X}{H}$

$$= \frac{2M}{\xi^3 H}$$

$$\frac{M}{H} = \frac{\xi^3 \operatorname{tg}\varphi}{2}$$

[illegible] MH [illegible] $\dfrac{M}{H}$ [illegible] Mostl.

Scala

2φ $\quad$ h $\quad$ Δ

$$\operatorname{tg} 2\varphi = \frac{h}{\Delta}$$

[illegible] Scala [illegible] $\perp$ [illegible]

[illegible]

[illegible]

[illegible] ξ. [illegible]

[illegible] 2 [illegible]

[illegible] Hamp. [illegible] Sand [illegible]

[illegible]

$\operatorname{tg}\varphi = \dfrac{2M}{\xi^3 H}$ $\qquad$ $M : M' = \operatorname{tg}\varphi : \operatorname{tg}\varphi'$

$\operatorname{tg}\varphi' = \dfrac{2M'}{\xi^3 H}$ $\qquad$ [illegible]

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Z, X, Y, M $\xi\ \eta\ \zeta$, m a b c

[illegible] Ω

$$= \frac{\Omega}{\sqrt{(\xi-a)^2+(\eta-b)^2+(\zeta-c)^2}}$$

[illegible] abc [illegible]

[illegible]

$$= f(\xi-a,\ \eta-b,\ \zeta-c)$$

$$= f(\xi\ \eta\ \zeta) + \frac{\partial f}{\partial \xi} a - \frac{\partial f}{\partial \eta} b - \frac{\partial f}{\partial \zeta} c +$$

$$+ \frac{1}{1.2}\left[\frac{\partial^2 f}{\partial \xi^2} a^2 + \frac{\partial^2 f}{\partial \eta^2} b^2 + \frac{\partial^2 f}{\partial \zeta^2} c^2 + 2\frac{\partial^2 f}{\partial \xi \partial \eta} ab + \right.$$

$$\left. + 2\frac{\partial^2 f}{\partial \xi \partial \zeta} ac + 2\frac{\partial^2 f}{\partial \eta \partial \zeta} bc\right] - \frac{1}{1.2.3}\left[\frac{\partial^3 f}{\partial \xi^3} a^3 + \cdots\right.$$

$$f = \frac{1}{\sqrt{(\xi-a)^2+(\eta-b)^2+(\zeta-c)^2}}$$

[illegible] $= \Sigma \frac{M}{\sqrt{\ }} =$

$$= f(\xi\ \eta\ \zeta) - \frac{\partial f}{\partial \xi}\Sigma Ma - \frac{\partial f}{\partial \eta}\Sigma mb - \frac{\partial f}{\partial \zeta}\Sigma mc +$$

[illegible] $= \eta$ [illegible]

$M = \Sigma m$ $\quad \Sigma mb = 0 \quad \Sigma mc = 0$

$P = -M\frac{\partial f}{\partial \xi}$ [illegible]

$$= -\frac{M\xi}{R^3}$$

$\Sigma ma^2 = 0$ [illegible] $P + 20$ [illegible] a^2 multi [illegible] $P - 20$ } [illegible]

$\Sigma mb^2 = 0 \quad \Sigma mc^2 = 0$

Σmab [illegible] $= 0$

$\sum m a^3 = N$ [illegible]

$\sum m b^3$, $\sum m c^3 = 0$ $\quad \sum m a^2 c$, $\sum m b^2 c = 0$

$\sum m b^2 a$, $\sum m c^2 a$ [illegible]

$\sum m a b^2 = N'$ $\quad \sum m a c^2 = N''$ $\quad \sum m a b c = 0$

$$P = - M \frac{\partial f}{\partial \xi} - \frac{1}{6}\left[N \frac{\partial^3 f}{\partial \xi^3} + 3 N' \frac{\partial^3 f}{\partial \xi \partial \eta^2} + 3 N'' \frac{\partial^3 f}{\partial \xi \partial \zeta^2} \right]$$

[illegible]

[illegible]

$$f = \frac{1}{\sqrt{\xi^2 + \eta^2 + \zeta^2}} = \frac{1}{R}$$

$$\frac{\partial f}{\partial \xi} = - \frac{1}{R^2} \frac{dR}{d\xi} = - \frac{\xi}{R^3}$$

$$\frac{\partial^2 f}{\partial \xi^2} = - \frac{1}{R^3} + 3 \frac{\xi^2}{R^5}$$

$$\frac{\partial^3 f}{\partial \xi^3} = + 3 \frac{\xi}{R^5} + 6 \frac{\xi}{R^5} - 15 \frac{\xi^3}{R^7}$$

$$\frac{\partial^2 f}{\partial \eta^2} = - \frac{1}{R^3} + 3 \frac{\eta^2}{R^5}$$

$$\frac{\partial^3 f}{\partial \xi \partial \eta^2} = \frac{3\xi}{R^5} - 15 \frac{\eta^2 \xi}{R^7}$$

$$\frac{\partial^3 f}{\partial \xi \partial \zeta^2} =$$

$$P = -M\frac{\partial f}{\partial \xi} - \frac{1}{6}\left[N\frac{\partial^3 f}{\partial \xi^3} + 3N'\frac{\partial^3 f}{\partial \xi \partial \eta^2} + 3N''\frac{\partial^3 f}{\partial \xi \partial \zeta^2}\right]$$

[illegible]

[illegible] m'

$$m' \begin{cases} \xi + a' \\ \eta + b' \\ \zeta + c' \end{cases}$$

$$P = f(\xi \eta \zeta).$$

$$P' = f(\xi + a', \eta + b', \zeta + c')$$

$$P' = P + \frac{\partial P}{\partial \xi}a' + \frac{\partial P}{\partial \eta}b' + \frac{\partial P}{\partial \zeta}c' +$$

$$+ \frac{1}{2}\left(\frac{\partial^2 P}{\partial \xi^2}a'^2 + \cdots\right) + \frac{1}{6}\left(\frac{\partial^3 P}{\partial \xi^3}a'^3 + \quad\right) +$$

$\sum P'm' =$ [illegible] Energie [illegible] $= U$

$$= P\sum m' + \frac{\partial P}{\partial \xi}\sum m'a' + \frac{\partial P}{\partial \eta}\sum m'b' + \frac{\partial P}{\partial \zeta}\sum m'c'$$

$$+ \frac{1}{2}\left(\frac{\partial^2 P}{\partial \xi^2}\sum m'a'^2 + \cdots\right.$$

= comp [illegible] [illegible] $\sqrt{A'^2 + B'^2 + C'^2}$

$$= \frac{\partial P}{\partial \xi}A' + \frac{\partial P}{\partial \eta}B' + \frac{\partial P}{\partial \zeta}C' + \cdots$$

[illegible]

[illegible]

[illegible]

$$U = -M\left[\frac{\partial^2 f}{\partial \xi^2}A' + \frac{\partial^2 f}{\partial \xi \partial \eta}B' + \frac{\partial^2 f}{\partial \xi \partial \zeta}C'\right]$$

$$f = \frac{1}{\sqrt{\xi^2 + \eta^2 + \zeta^2}} = \frac{1}{R} \qquad \frac{\partial f}{\partial \xi} = -\frac{\xi}{R^3} \qquad \frac{\partial^2 f}{\partial \xi^2} = -\frac{1}{R^3} + \frac{3\xi^2}{R^5}$$

$$\frac{\partial^2 f}{\partial \xi \partial \eta} = \frac{3\xi\eta}{R^5} \qquad \frac{\partial^2 f}{\partial \xi \partial \zeta} = \frac{3\xi\zeta}{R^5}$$

$$U = -M\left[-\frac{1}{R^3}A' + \frac{3}{R^5}\left(\xi^2 A' + \xi\eta B' + \xi\zeta C'\right)\right]$$

$$= \frac{M}{R^3}\left[M'\cos\varepsilon - 3\frac{\xi M'}{R}\left(\frac{\xi}{R}\frac{A'}{M'} + \frac{\eta}{R}\frac{B'}{M'} + \frac{\zeta}{R}\frac{C'}{M'}\right)\right]$$

$\varepsilon = \measuredangle$ [illegible] $= \measuredangle$ [illegible]

$\frac{\xi}{R} = \cos\measuredangle$ [illegible] OM [illegible] $= \vartheta$

$$U = \frac{MM'}{R^3}\left[\cos\varepsilon - 3\cos\theta\cos\theta'\right]$$

[illegible]

[illegible]

[illegible] N' [illegible] N'' [illegible] N [illegible].

$$P = -M\frac{\partial f}{\partial \xi} - \frac{N}{6}\frac{\partial^3 f}{\partial \xi^3}$$

$$U = -M\left[\frac{\partial^2 f}{\partial \xi^2}A' + \frac{\partial^2 f}{\partial \xi \partial \eta}B' + \frac{\partial^2 f}{\partial \xi \partial \zeta}C'\right] - \frac{N}{6}\left[\frac{\partial^4 f}{\partial \xi^4}A' + \frac{\partial^4 f}{\partial \xi^3 \partial \eta}B' + \frac{\partial^4 f}{\partial \xi^3 \partial \zeta}C'\right]$$

[illegible] $B' = 0$

$A' = M' \sin\varphi \qquad C' = M' \cos\varphi$

$\xi = R \quad \eta = \zeta = 0$ [illegible]

[illegible] $\xi = 0$

$$U = - MM' \frac{\partial^2 f}{\partial \xi^2} \sin\varphi - \frac{NM'}{6} \frac{\partial^4 f}{\partial \xi^4} \sin\varphi$$

$$\frac{\partial^2 f}{\partial \xi^2} = -\frac{1}{R} + 3\frac{\xi^2}{R^5}$$

$$\frac{\partial^3 f}{\partial \xi^3} = \frac{9\xi}{R^5} * - \frac{15\xi^3}{R^7}$$

$$\frac{\partial^4 f}{\partial \xi^4} = \frac{9}{R^5} - \frac{90\xi^2}{R^7} + \frac{105\xi^4}{R^9}$$

$\xi = R$

$$\frac{\partial^2 f}{\partial \xi^2} = \frac{2}{R^3}$$

$$\frac{\partial^4 f}{\partial \xi^4} = \frac{24}{R^5} \qquad U = -\frac{2MM'}{R^3}\sin\varphi - \frac{4NM'}{R^5}\sin\varphi$$

[illegible]

φ [illegible]

[illegible] $= -\frac{\partial U}{\partial \varphi} =$

$$= \left(\frac{2MM'}{R^3} + \frac{4NM'}{R^5}\right)\cos\varphi$$

[illegible] $=$

$$M' H \sin\varphi = \left(\frac{2MM'}{R^3} + \frac{4NM'}{R^5}\right)\cos\varphi$$

$$\operatorname{tg}\varphi = \frac{2M}{HR^3} + \frac{4N}{HR^5}$$

[illegible] $< e \frac{N}{H}$ /

[illegible]: [illegible] R_1 [illegible]

[illegible] φ_1 [illegible] N [illegible]

$$\operatorname{tg}\varphi_1 = \frac{2M}{HR_1^3} + \frac{4N}{HR_1^5}$$

$$R^5 \operatorname{tg}\varphi = \frac{2M}{H}R^2 + \frac{4N}{H}$$

$$R_1^5 \operatorname{tg}\varphi_1 = \frac{2M}{H}R_1^2 + \frac{4N}{H}$$

$$\frac{R^5 \operatorname{tg}\varphi - R_1^5 \operatorname{tg}\varphi_1}{R^2 - R_1^2} = \frac{2M}{H}$$ = [illegible]

[illegible]

[illegible] 1–5° [illegible] Pot. [illegible]

[illegible]

12/1 [illegible]

[illegible]

m $\xi\eta\zeta$ $x'y'z'$

dx dy dz [illegible] Vol. [illegible]

[illegible]

$\mu\, dx\, dy\, dz =$

μ = [illegible] Vol. [illegible]

$\alpha\beta\gamma$ = Comp. [illegible]

$\alpha\, dx\, dy\, dz$ = [illegible] X [illegible]

$P = \frac{A\xi + B\eta + C\zeta}{R^3}$ = Pot. [illegible]

$A = \Sigma m\alpha$ $B =$ $C =$

$\xi = x' - x$ $\quad R^2 = (x'-x)^2 + (y'-y)^2 + (z'-z)^2$

$\eta = y' - y$

$\zeta = z' - z$

$A = \alpha \, dx \, dy \, dz$

$B = \beta \, dx \, dy \, dz$

$C = \gamma \, dx \, dy \, dz$

$$\frac{\alpha[x'-x] + \beta[y'-y] + \gamma(z'-z)}{R^3} \, dx \, dy \, dz = P. \text{ Vol. } [illegible]$$

$$U = \iiint \frac{\alpha(x'-x) + \beta(y'-y) + \gamma(z'-z)}{R^3} \, dx \, dy \, dz$$ [illegible]

$$\frac{x'-x}{R^3} = \frac{d}{dx}\left(\frac{1}{R}\right) \quad . \frac{y'-y}{R^3} = \frac{d}{dy}\left(\frac{1}{R}\right) \quad \frac{z'-z}{R^3} = \text{———}$$

$$U = \iiint \left[\alpha \frac{d}{dx}\left(\frac{1}{R}\right) + \beta \frac{d}{dy}\left(\frac{1}{R}\right) + \gamma \frac{d}{dz}\left(\frac{1}{R}\right)\right] dx \, dy \, dz$$

$$= \iiint \alpha \frac{d}{dx}\left(\frac{1}{R}\right) dx \, dy \, dz = \iint \alpha \frac{1}{R} \, dy \, dz - \iiint \frac{1}{R} \frac{d\alpha}{dx} \, dx \, dy \, dz$$

[illegible]

[illegible] Greens'schen [illegible]

$dy \, dz = ds \cos\lambda \qquad \lambda = \angle$ [illegible]

~~[illegible]~~ [illegible]

$$\iiint \alpha \frac{d}{dx}\left(\frac{1}{R}\right) dx \, dy \, dz = \iint \alpha \frac{1}{R} \, ds \cos\lambda - \iiint \frac{1}{R} \frac{d\alpha}{dx} \, dx \, dy \, dz$$

$$U = \iint \frac{\alpha \cos\lambda + \beta \cos\mu + \gamma \cos\nu}{R} \, ds - \iiint \frac{1}{R}\left[\frac{d\alpha}{dx} + \frac{d\beta}{dy} + \frac{d\gamma}{dz}\right] dx \, dy \, dz$$

[illegible] Pot. [illegible] Pot. [illegible]

R: [illegible]

[illegible]

[illegible]

[illegible]

[illegible] Prisma, [illegible]

[illegible]

$abc\mu$

[illegible]

$-bc\sigma \qquad +bc\sigma$ [illegible] $\sigma = $ [illegible]

$M = bc\sigma a = $ [illegible]

$= abc\mu$

$\sigma = \mu$

[illegible] magn. Prism [illegible]

[illegible] μ:

[illegible]

$M = abc\mu$

[illegible]

[illegible]

$-f\sigma = $ [illegible] $\quad +f\sigma = $ [illegible]

$M = f\sigma a \qquad f\cos\varphi = bc$

$= \frac{\sigma a\, bc}{\cos\varphi} \qquad \frac{\sigma}{\cos\varphi} = \mu \qquad \sigma = \mu\cos\varphi$

[illegible] $= \mu \cos$ [illegible] $\times \cos\varphi$

$\varphi = \measuredangle$ [illegible] $N.$ [illegible]

$f\,g\,h \qquad \alpha = \mu\cos f \qquad \beta = \mu\cos g \qquad \gamma = \mu\cos h$

$\alpha\cos\lambda + \beta\cos\mu + \gamma\cos\nu = \mu[\cos f\cos\lambda + \dots]$

$= \mu\cos\varphi$ [illegible] ……

[illegible] $\iint = $ [illegible]

[illegible] $\iiint$: [illegible] const. $\frac{d\alpha}{dx} = 0$, [illegible]

[illegible]

[illegible] $-$ [illegible] $\frac{d\alpha}{dx}$ [illegible]

$+$ $\frac{d\alpha}{dx}$ [illegible]

[illegible] $\iiint$

$\alpha\cos\lambda + \beta\cos\mu + \gamma\cos\nu = \sigma$

$-\left(\frac{d\alpha}{dx} + \frac{d\beta}{dy} + \frac{d\gamma}{dz}\right) = \rho$

$$U = \iint \frac{\sigma\,ds}{R} + \iiint \rho\frac{dx\,dy\,dz}{R}$$

22/3

Ohm'sches!

[illegible]

[illegible]

[illegible]

[illegible] meth. [illegible] Ohm.

[illegible] [[illegible] Fourier]

u_1 m m' u_2

a ——————————— b [illegible]

[illegible]

[illegible]

exp. [illegible]

[illegible]

[illegible]

[illegible]

[illegible] Fourier:

$W = q \frac{u_1 - u_2}{l} \cdot k\, t$ k = Prop. f.

$= k q \frac{u - u'}{\lambda} t$ $u = f(x)$ $u' = f(x+\lambda)$ $\frac{u' - u}{\lambda} = f'(x) = \frac{du}{dx}$

$= -k q \frac{du}{dx} t$ [illegible]

$= -\frac{du}{dx} dt$ [illegible]

[illegible]

[illegible] const. [illegible] const. [illegible]

[illegible] $= i$

$i = -k\,q\,\frac{dP}{dx}$ $\quad dt = 1$

[illegible]

[illegible] $\frac{dp}{dx} = \text{const}$ [illegible]

P_1 $\quad l \quad$ P_2

$-\frac{dP}{dx} = \frac{P_1 - P_2}{l}$

$i = kq\,\frac{P_1 - P_2}{l}$ $\qquad \frac{l}{kq}$ [illegible] w = [illegible]

$i = \frac{P_1 - P_2}{w}$ } Ohm'sches [illegible]

Ohm [illegible] elektron. [illegible] w

[illegible]

[illegible]

[illegible]

exp. [illegible] const. [illegible]

$\frac{d^2P}{dx^2} + \frac{d^2P}{dy^2} + \frac{d^2P}{dz^2} = 0$

$\frac{d^2P}{dx^2} = 0$ $\quad$ $\frac{d^2P}{dy^2} + \frac{d^2P}{dz^2}$: 0, [illegible] const.

[illegible] $\frac{dP}{dx} = c.$

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

P i_2 w_2 λ_2 P_1 P_2 i i_1 w_1

[illegible]

$$i = i_1 + i_2$$

$$i_1 = \frac{P_1 - P_2}{w_1}$$

$$i_2 = \frac{P_1 - P_2}{w_2}$$

$$i_1 w_1 = i_2 w_2$$

$$i_2 = \frac{P_1 - P}{\lambda_2}$$

P'' i_2 w_3 w_4 P_1 P_2 w_2 w_1 P' i_1

$$i_1 = \frac{P_1 - P'}{w_1} = \frac{P' - P_2}{w_2}$$

$$i_2 = \frac{P_1 - P''}{w_3} = \frac{P'' - P_2}{w_4}$$

[illegible] $P' = P''$

[illegible] $= 1$

$$\frac{i_1 w_1}{i_2 w_3} = \frac{P_1 - P'}{P_1 - P''} = 1$$

$$\frac{i_1 w_2}{i_2 w_4} = \frac{P' - P_2}{P'' - P_2} = 1$$

~~$$\frac{i_1 w_1}{i_2 w_3} = \frac{i_1 w_2}{i_2 w_4}$$~~

[illegible] P_1 [illegible]

Wheatstone'sche Brücke

23/3 [illegible] elektr. [illegible]

elektr. [illegible] [illegible]; [illegible]

[illegible] elektrostat. [illegible]

[illegible]; chemische [illegible] magnetische

chemische: [illegible]

[illegible] 1 mm 1 cm^3 H_2, O_2 [illegible]

[illegible] Polaris., [illegible]

[illegible] magn. [illegible]

[illegible] Ampère'sche [illegible]

[illegible] ⊥ [illegible]

[illegible] Biot [illegible] Savart [illegible] Ampère.

m [illegible]

[illegible] =

= [illegible]

[illegible] ⊥ [illegible]

θ

[illegible]

[illegible] : $f_c[\overline{AB}, i, m, r, \theta]$

[illegible] θ [illegible] $90°$; [illegible] $\theta = 0$ [illegible]

[illegible]

[illegible] $\sin\theta$ [illegible]

[illegible] :

[illegible]

[illegible] :

[illegible] Amp. [illegible]

[illegible]

m ab [illegible] ad [illegible] ac

ac [illegible] ad [illegible] = $\sin\theta$ ab

d b a c θ

[illegible] r^2, [illegible] i, m.

$$K = \varepsilon \frac{AB \sin\theta \; i \; m}{r^2}$$

2B. [illegible]

a b

m

$\sin\theta = 1$

$$\sum \frac{\varepsilon \, \overline{ab} \; i m}{r^2} = \frac{\varepsilon i m}{r^2} \sum \overline{ab} = \frac{\varepsilon i m}{r^2} 2\pi r$$

$$= \frac{2 \varepsilon i m \pi}{r}$$

[illegible] experim. [illegible]

$$K = \frac{2\pi \varepsilon i m}{r}$$ [illegible]

[illegible]

[illegible]

s m

[illegible]

N. Pol.: $H m \frac{\lambda}{2} \sin\varphi$ $\quad K \frac{\lambda}{2} \cos\varphi$

S. Pol.: $H m \frac{\lambda}{2} \sin\varphi$ $\quad K \frac{\lambda}{2} \cos\varphi$

$$H m \lambda \sin\varphi = K \lambda \cos\varphi$$

$$= \frac{2\pi \varepsilon i m}{r} \lambda \cos\varphi$$

K n φ s s'

$$H \sin\varphi = \frac{2\pi\varepsilon i}{r} \cos\varphi$$

$$i = \frac{rH}{2\pi\varepsilon} \operatorname{tg}\varphi$$ [illegible]

H, r [illegible] cm, $cm^3\ H_2O$, 1 sec

[illegible] ε [illegible]

[illegible] $\varepsilon = 1$ [illegible] $K = \frac{i\,m\,ds}{r^2} \sin\theta$

[illegible] elektr. [illegible] 120.

[illegible] $\frac{1}{10}$ [illegible]

$\varepsilon = \frac{1}{10}$ = Ampère

$i = 10\,\frac{rH}{2\pi} \operatorname{tg}\varphi$ [illegible] Amp.

[illegible] 1837 [illegible] Wilh. Weber [illegible].

[illegible]

[illegible] empir. [illegible]; Jakobi [illegible] Petersb. [illegible]

[illegible] Structur [illegible]

[illegible] W. Siemens [illegible] Hg; – [illegible] 1 mm^2

[illegible] 1 m [illegible], [illegible] 0° = 1 Siemens.

[illegible] Lenz [illegible] Petersb.

[illegible] Joule [illegible] Joule's 1:

[illegible] sec [illegible] const. [illegible] =

$C = \gamma w i^2$

[illegible] $g = 1\,g$ [illegible] Rabs. [illegible]

120 [illegible] [C. 42500 . 9806 = ---]

1 [illegible] 94.10^7 abs. [illegible] = 1 Siemens.

[illegible]

24/3 [illegible]

Induction elektr. [illegible]

Farad. [illegible]

[illegible]

Lenz [illegible] induc. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Neumann - Theorie [illegible]

[illegible] Energie ; [illegible]

[illegible] induc.

[illegible] [Helmholtz [illegible]].

[illegible]

[illegible] i $\quad \varepsilon = 1$

$\frac{2\pi}{r}$ [illegible] i cos φ

$m\lambda = M$ = [illegible]

[illegible] $d\varphi$

$$\frac{2\pi M i}{r}\cos\varphi\, d\varphi = \text{aequiv.} \ldots$$ [illegible]

$$= w\, i^2\, dt$$

$$w\int i\, dt = \frac{2\pi M}{r}\int\cos\varphi\, d\varphi$$

[illegible]

[illegible] ballist. [illegible]

$$w\int i\, dt = \frac{2\pi M}{r}$$ $i\,dt$ [illegible]

[illegible]

II Art. [illegible] Galvanom.

[illegible] induc. [illegible]

[illegible] Amplit. [illegible]

= [illegible] ind. [illegible]

$$K\frac{d^2\varphi}{dt^2} = -MH\sin\varphi - \frac{2\pi M i}{r}\cos\varphi$$

$$w\, i\, dt = \frac{2\pi M}{r}\cos\varphi\, d\varphi$$

$$i = \frac{2\pi M}{wr}\cos\varphi\,\frac{d\varphi}{dt}$$

$$K\frac{d^2\varphi}{dt^2} = -MH\sin\varphi - \frac{4\pi^2 M^2}{wr^2}\cos^2\varphi\,\frac{d\varphi}{dt}$$

[illegible] $\sin\varphi \sim \varphi$
$\cos\varphi \sim 1$

$$K\frac{d^2\varphi}{dt^2} = -MH\varphi - \frac{4\pi^2 M^2}{w\, r^2}\frac{d\varphi}{dt}$$

[illegible]

$w = 8 d.$	[illegible]
III Art.	[illegible]

[illegible]

ds ……… m $\qquad \frac{m\, i\, ds}{r^2}\sin\theta$

[illegible] ; $\frac{m}{r^2}$ = [illegible]

[illegible]

[illegible]

$\frac{m\, i\, ds \sin\theta}{r^2}\, dy$ } [illegible]

= [illegible]

[illegible] ⊥ [illegible]

10^9 absol. Einh. = 1 prakt. Einh. = Ohm

= Hg [illegible] 1 mm², 106 cm [illegible].

[illegible] abs. [illegible]

$108 \cdot 10^6$ = [illegible] Daniell

10^8 = Volt. = [illegible]

[illegible] Ohm [illegible]

$= \frac{1}{10} =$ [illegible]

Watt = [illegible]

= [illegible] 1 Ohm [illegible]

[illegible] 1 sec. [illegible]

$= w i^2 = e i$

= 1 Volt Ampère

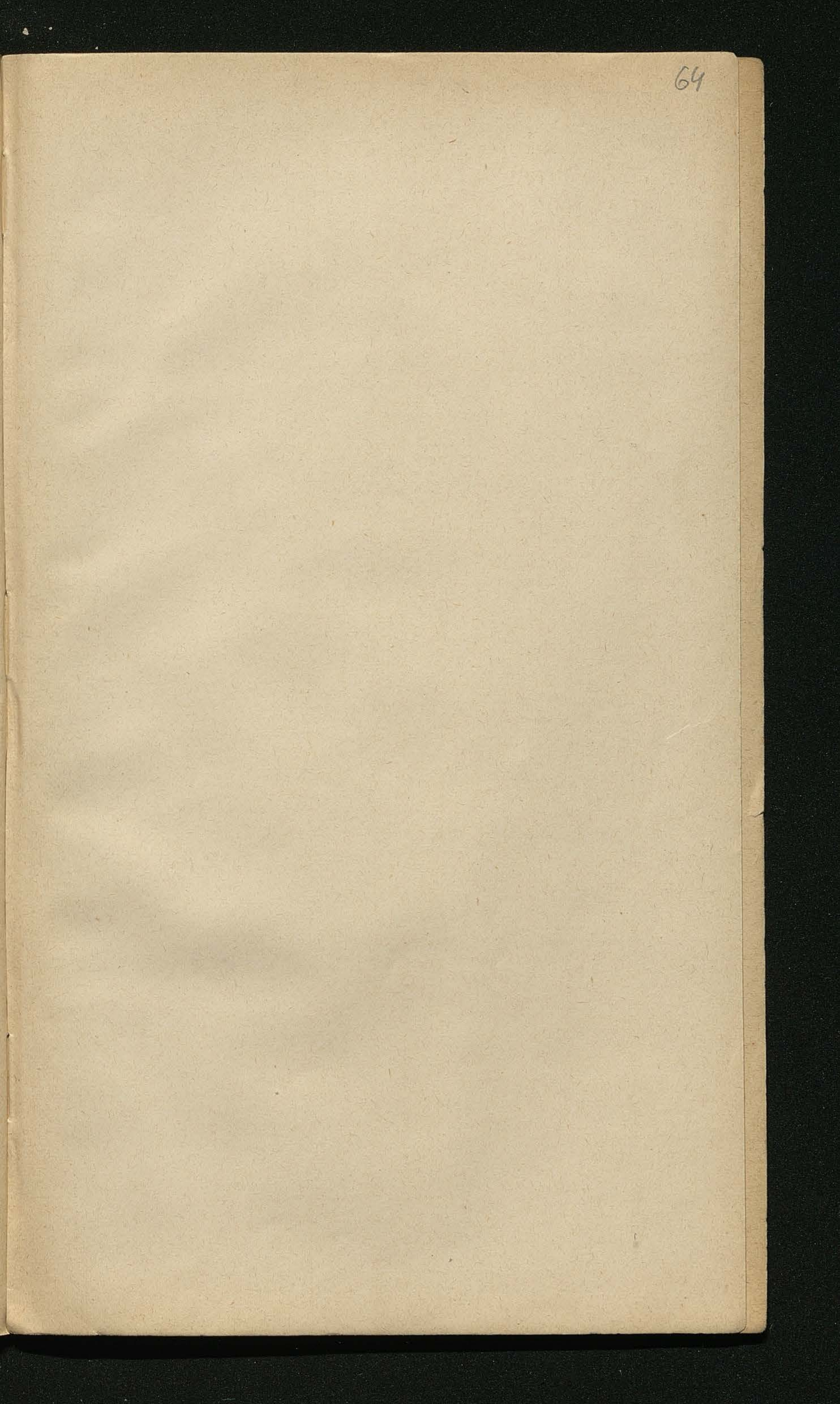
$= 10^7$ abs. [illegible] 1 sec.

735 W. = 1 Pferde[illegible]

[illegible] 50 Volt, 10 Ampère

[illegible] 500 Watt = 3/4 Pf.

[illegible] 1 Pf.


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